

Environment

~~((With chinook salmon and bull trout now listed as a threatened species, and other valued species dangerously close to joining the list, protecting both our rural and urban environments remains a critical concern.~~

~~King County's regulations for protecting the environment are some of the most stringent in the country. In a region as rainy as the Pacific Northwest, maintaining healthy wetland systems, controlling stormwater runoff and preventing development on sloping hillsides are all vital in preventing erosion and flooding. Without proper regulatory control, damage to private property, as well as salmon streams, is unavoidable and costly.))~~

King County has a diverse array of environmental resources and conditions, ranging from highly urbanized areas to nearly pristine environments in the foothills of the Cascades. King County residents depend on sound environmental management not only to protect public health and safety, but also to preserve quality of life for future generations.

One of the central tenets of the Growth Management Act (GMA), the Countywide Planning Policies, and King County's Comprehensive Plan is that new growth be focused within designated urban areas with the aim of protecting resource lands (forestry, agriculture, and mining) and reducing development pressure on the Rural Area. At the same time, GMA requires that critical areas be designated and protected. Critical areas include wetlands, areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas and geologically hazardous areas. Achieving development goals must be ((balanced)) integrated with protecting critical area functions and values. ((tailoring-i)) Individual solutions can be tailored by following the guidance of comprehensive plan policies that recognize both critical area protection and the need to reduce urban sprawl.

All parts of the county—from densely developed urban areas, to farm and forest land, to the Rural Area—have a role to play and a common interest in environmental protection. Responsibility for environmental protection cannot fall on one geographic area or category of citizens alone. Tools for environmental protection, for all residents whether in the Urban or Rural Area, include buying locally grown produce at a farmers market, taking care to avoid polluted discharges to storm drains, riding the bus, investing in natural resource programs like those offered by the King Conservation District, complying with stormwater standards, controlling invasive plants, and protecting forest cover. For urban residents, environmental protection occurs through different means, including investing in wastewater treatment and stormwater improvements, protecting greenbelts and other remnants of native habitats, and living in densely developed areas. For rural residents, it means protecting aquifers used for drinking water, using development practices that slowly infiltrate stormwater, and using best management practices to protect water quality. On farm lands, forest lands, and lands in the Rural Area, stewardship plans provide a flexible tool for supporting long-term resource use while protecting the environment.

One of the most significant environmental issues facing King County during the past decade was the listing of Chinook salmon and bull trout as threatened under the Endangered Species Act (ESA). Since 2000, the region has seen unprecedented cooperation between local governments, citizens, tribes, conservation districts, non-profit groups, and federal and state fisheries managers to develop watershed-based salmon conservation plans, known as Water Resource Inventory Area (WRIA) plans. These plans, known as the Shared Strategy for Puget Sound, form the basis for the federal recovery plan for Chinook salmon. Watershed partners are continuing to work together to implement and monitor these plans through WRIA Forums. King County has taken significant steps to increase protections for Chinook and other salmon species through changes in daily operations (like maintenance of county roads and parks), increased open space protection, tax incentives, and updated development regulations. The lessons learned and relationships developed through cooperative planning in response to the Chinook

salmon and bull trout listings should help to inform King County's response to new listings, and bolster efforts to prevent future species listings.

The most recent listings for Puget Sound Orca (2006) and Steelhead (2007) under the ESA provide a clear and important lesson: single-species approaches to habitat conservation and recovery are not likely to be sustainable and can have unintended consequences. Nationally and internationally, many governments are shifting the emphasis of their environmental protection efforts from single species management to protection of biodiversity. Biodiversity refers not only to plants and animals but also to their habitats and the interactions among species and habitats.

Protection of biodiversity in all its forms and across all landscapes is critical to continued prosperity and quality of life in King County. In fisheries, forestry, and agriculture, the value of biodiversity to sustaining long-term productivity has been demonstrated in region after region. With the impending effects of climate change, maintaining biodiversity will be critical to the resilience of resource-based activities and to many social and ecological systems. The continued increase in King County's population and the projected effects of climate change make conservation a difficult but urgent task.

State and federal agencies are undertaking biodiversity initiatives. The Washington State Biodiversity Council was created by the Governor in 2004, in part, with the aim of refocusing state conservation efforts from the species level to the ecosystem level. The Washington State Department of Fish and Wildlife (WDFW) is in the process of updating its Priority Habitats and Species recommendations to reflect a more integrated, landscape approach. The United States Forest Service is also integrating biodiversity principles into its land management practices. Internationally, the International Council for Local Environmental Initiatives (ICLEI) Local Action for Biodiversity Project (LAB) has convened local governments from around the world, including King County, to profile and promote the importance of urban biodiversity. The LAB Project will explore the best ways for local governments to engage in biodiversity management and conservation.

Climate change has the potential for severe and wide-ranging impacts on public health, safety, and welfare; the economy; and the environment. Climate change in the Pacific Northwest is projected to bring more severe winter storms and summer droughts, decreased water supplies for people and fish, and changes in habitat and species distribution. King County is a leader in taking steps to mitigate our local impacts on climate change and to adapt to climate change.

Environmental initiatives during the past decade have underscored the need for monitoring changes in our environment and our efforts to protect it. Monitoring and performance measurement help local governments to target limited resources, determine whether actions are having their intended effect, promote accountability, and adapt approaches to environmental management. The Executive's KingStat program is using environmental monitoring data to assess environmental conditions, develop appropriate county responses, and provide an opportunity to collaborate and partner with other organizations in making improvements.

The Environment Chapter has been updated to integrate county strategies for protection of land, air, and water; to emphasize implementation of salmon recovery plans; to reflect increased emphasis on climate change and biodiversity; and to support monitoring and adaptive management. These policies guide King County's environmental regulations and incentives, education and stewardship programs in unincorporated King County.

I. Natural Environment and Regulatory Context

A. ((Protection and Regulation)) Integrated Approach

~~((Protecting and restoring air quality, water resources, soils, and plant, fish and animal habitats are among King County's primary goals. This chapter establishes policies to protect the environment and enhance the region's high quality of life. Most of this chapter's policies provide a basis for either new nonregulatory approaches or for existing regulations. Some new regulations are necessary to implement the policies. However, new regulations such as wetland mitigation banking offer flexibility compared with existing regulations.~~

~~Every resident of King County has an equal right to a healthy and safe environment. This requires that our air, water, earth and food be of a sufficiently high standard that individuals and communities can live healthy, fulfilling and dignified lives. The duty to enhance, protect and preserve King County's environment rests on the shoulders of government, residents, resident groups and businesses alike.~~

~~While critical areas within the Urban Growth Area will receive adequate protection, the emphasis is to protect and enhance critical areas in the Rural Area and Natural Resource Lands and to avoid impacts to specific animal species, such as salmon and bald eagles, that use or pass through the Urban Growth Area.))~~

Environmental protection efforts need to be integrated across species, habitats, ecosystems, and landscapes. Efforts to reduce flooding or protect water quality and habitat cannot work successfully in isolation from management of land use across the larger contributing landscape. Efforts to protect one particular species could be detrimental to another if such efforts are not considered in an ecosystem context.

Likewise, the tools King County uses to protect the environment—education, stewardship, incentives, regulations, changes in county operations, planning, capital projects, land acquisition, and monitoring—also need to be integrated. For example, the regulatory buffers placed around wetlands need to consider changing conditions in the watershed around the wetland. These conditions are influenced by land use, stormwater management, clearing and grading requirements, and protection of forest cover and open space. Incentives, education, and technical assistance programs also must work hand-in-hand so that land owners can access a seamless set of programs that work together to accomplish environmental protection.

As part of the last major Comprehensive Plan Update in 2004, King County updated its critical areas, stormwater management, and clearing and grading regulations consistent with GMA requirements to include Best Available Science. These regulations are functionally interrelated, with the standards for protection of wetlands, aquatic areas, and wildlife areas also working in tandem with landscape-level standards for stormwater management, water quality, and clearing and grading.

Habitat conditions vary throughout unincorporated King County, with higher quality habitat generally found in less developed areas of the county. However, both urban and rural habitats play a critical role for various species and during different life stages. The environmental protections we use should consider development patterns, habitat conditions, and the roles played by different geographic and ecologic areas. These policies provide for a geographic and watershed-based approach to planning, stewardship, and environmental protection. This approach acknowledges that different areas of King County may have different environmental and resource values and face different levels of development pressure(;;). I((#))herefore, ((different)) methods of protecting critical areas that respect those

distinctions ((need to)) must be developed to balance the protection of the environment with the need to reduce urban sprawl and preserve our quality of life.

A key facet of critical areas regulations adopted in 2004 is a provision allowing for tailored application of protections to Rural Area-zoned properties through a "Rural Stewardship Plan." In concert with these regulatory updates, the county strengthened incentives available to land owners through the Public Benefit Rating System, a tax incentive program through which landowners can receive reduced property taxes in exchange for commitments to protect open space and natural resources.

E-101 **In addition to its regulatory authority, King County should use incentives to protect and restore the natural environment whenever practicable. Incentives should be monitored to determine their effectiveness in terms of protecting natural resources.**

E-102 **King County should take a regional role in promoting and supporting environmental stewardship through direct education, coordinating of educational efforts and establishing partnerships with other entities that share similar environmental concerns ~~((and))~~ and stewardship opportunities.**

King County ~~((needs to))~~ coordinates many programs with other agencies and governments. The cooperative development of watershed-based salmon recovery plans over the last decade has brought together local governments, federal and state agencies, citizens, and interest groups. Continued collaboration at the watershed level will be necessary to make these habitat-focused plans a reality. Working closely with tribes and the Washington Department of Fish and Wildlife will be essential to ensure that watershed-based salmon recovery strategies effectively integrate habitat, harvest and hatchery actions.

A critical new venue for coordination is the Puget Sound Partnership, created by the Washington State Legislature and Governor in July, 2007. The Puget Sound Partnership was formed to achieve the recovery of the Puget Sound ecosystem by the year 2020. This new state agency replaces both the Puget Sound Action Team and the Shared Strategy for Salmon Recovery. Its goal is to consolidate and significantly strengthen the federal, state, local, and private efforts undertaken to date to protect and restore the health of Puget Sound and its watersheds. Additional discussion of King County's participation in the Puget Sound Partnership is found later in this chapter.

~~((Coordination with the Washington State Department of Ecology and affected jurisdictions is necessary to comply with mandates of the Clean Water Act that address point and non-point source pollution. Further coordination with air quality agencies, such as the Puget Sound Air Pollution Control Agency and Puget Sound Regional Council, is needed to exchange information and develop consistent programs. Coordination with water service providers who use groundwater sources is necessary to protect the region's groundwater quantity and quality.))~~ King County also works closely with federal and state agencies, cities, and other counties to try to integrate and streamline compliance with federal mandates like the Clean Water Act, Clean Air Act, and Endangered Species Act. In doing so, multiple benefits can be achieved. For example, in some cases mandated monitoring for Clean Water Act compliance can provide useful information to support salmon conservation efforts.

E-103 **King County should coordinate with local jurisdictions, universities, federal and state agencies, ~~((federally recognized))~~ tribes, citizen interest groups, special districts, businesses, and citizens to develop, implement, monitor and update Water Resource Inventory Area plans for all areas of King County.**

E-104 **Development of environmental regulations, ~~((and))~~ restoration projects, and stewardship programs should be coordinated with local jurisdictions, federal and state agencies, ~~((federally recognized))~~ tribes, special interest groups and citizens when ~~((protecting))~~ conserving and restoring the natural environment consistent with Urban Growth Area, Rural Area and designated Natural Resource Land goals.**

King County will use existing and updated subarea and functional plans and Water Resource Inventory Area plans to provide guidance to programs, regulations and incentives to protect and restore environmental quality.

E-105 Environmental quality and important ecological functions shall be protected and hazards to health and property shall be minimized through development reviews and implementation of land use plans, Water Resource Inventory Area plans, surface water management plans and programs, flood hazard ~~((reduction))~~ management plans, environmental monitoring programs, and park master plans. These plans shall also encourage stewardship and restoration of critical areas as defined in the Growth Management Act, and include an adaptive management approach.

E-106 King County wishes to create an equitable relationship with all citizens in the Rural Area who own ~~((and/))~~ or control potential development or redevelopment of property with critical ~~((and/))~~ or significant resource areas. King County should continue to provide options for property-specific technical assistance and tailored applications of critical areas regulations through Rural Stewardship, Forest Stewardship, and Farm Management Plans. However, some affected property owners may not wish to ~~((enter into a rural stewardship, or farm, or forestry stewardship))~~ pursue one of these plans and will choose to accept fixed regulations under the critical areas, clearing and grading, and stormwater ordinances. These property owners are entitled to have their property assessed at the true and fair value of real property for taxation purposes. The portion(s) of a property that are not developed or redeveloped due to environmental constraints shall be assessed to reflect the presence of physical and environmental constraints as provided in RCW 84.40.030 and K.C.C. 4.62.010, 4.62.020, and 4.62.030.

E-107 The protection of lands where development would pose hazards to health, property, important ecological functions or environmental quality shall be achieved through acquisition, enhancement, incentive programs and appropriate regulations. The following ~~((natural landscape features))~~ critical areas are particularly susceptible and should be protected:

- a. Floodways of 100-year floodplains;
- b. Slopes with a grade of 40 percent or more or landslide hazards that cannot be mitigated;
- c. Wetlands and their protective buffers;
- d. Aquatic areas, including streams, lakes, saltwater shorelines and their protective buffers;
- e. Channel migration hazard areas;
- f. Designated wildlife habitat networks;
- g. Critical Aquifer Recharge Areas;
- h. Marine beaches, wetlands, intertidal and subtidal habitat and riparian zones including bluffs;
- i. Regionally Significant Resource Areas and Locally Significant Resource Areas; ~~((and))~~
- j. Fish and Wildlife Habitat Conservation Areas ~~((, and other critical habitat areas identified for protection through Water Resource Inventory Area plans.))~~; and
- k. Volcanic hazard areas.

E-108 Regulations to prevent unmitigated significant adverse impacts will be based on the importance and sensitivity of the resource. The presence of a species listed as endangered or threatened by the federal government may be considered an unusual circumstance. ~~((and the e))~~ King County may ((use)) exercise its substantive authority under the State Environmental Policy Act (SEPA) to condition or deny development proposals in order to mitigate ((for significant adverse environmental)) associated individual or cumulative impacts ((to that habitat that supports those species)) such

as significant habitat modification or degradation that may actually kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, spawning, rearing, migrating or sheltering.

E-109 King County should promote efficient provision of utilities and public services by exempting minor activities from its critical areas regulations, ~~((provided))~~ if the agency has an approved best management practice plan approved by King County, and the plan ensures that proposed projects that may affect habitat of listed species be carried out in a manner ~~((which))~~ that protects the resource or mitigates adverse impacts.

B. Policy and Regulatory Context

1. Endangered Species Act

King County is approaching the ten year anniversary of the first proposal to list one of our native salmon under the Endangered Species Act (ESA). In March 1998, The National Marine Fisheries Service (NMFS) proposed to list the Puget Sound Chinook salmon as "threatened" under the Endangered Species Act (ESA). (In December 1999, the U.S. Fish and Wildlife Service (USFWS) listed the Puget Sound and Coastal Bull trout as threatened under the ESA. It is anticipated that listing of other salmonid species may follow in the near future.) This Chinook population was officially listed in March 1999. The listing of Chinook as threatened triggered a requirement for consultations with NMFS on any activity requiring a federal permit, relying on federal funds, or being sponsored by a federal agency.

Since that listing, several other aquatic species present in King County have been listed as threatened, including two salmonids: bull trout in November 1999, and steelhead in May 2007. Kokanee salmon in Lake Sammamish have been petitioned for ESA listing, and coho salmon are considered a Species of Concern. Puget Sound's resident Orca, which rely almost solely on salmon as a food source, were also listed under the ESA as endangered in November 2005.

(In accordance with the ESA, National Oceanic Atmospheric Administration (NOAA) Fisheries) NMFS and the United States Fish and Wildlife Service, have issued rules describing regulations deemed necessary to ~~((provide for the conservation of))~~ conserve Puget Sound Chinook salmon and other West Coast salmonids. ~~((This))~~ These rules, commonly referred to as ~~((a))~~ "4(d) rules," legally establish ~~((es))~~ the protective measures that are necessary ~~((and advisable))~~ to provide for conservation of a listed species. ~~((The))~~ These rules also make ~~((s))~~ it a violation of the ESA for any person, government, or other entity to "take" a threatened species. Prohibited "take" under the ESA includes ~~((altering habitat of a listed species such that it causes harm))~~ harm through significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, spawning, rearing, migrating or sheltering.

The 4(d) rule for Chinook and steelhead also establishes conditions or limits under which certain categories of activities that may result in "take" may be conducted. King County takes actions under the conditions established for two categories of action: routine road maintenance and habitat restoration projects funded by the State Salmon Recovery Funding Board.

Final ESA Recovery Plans have been developed for Chinook (2007) and bull trout (2004). A draft Recovery Plan for Orca whales was published in late 2006. These plans describe recovery goals for the species, specific measures to address the factors that are limiting the health of the species, and timeframes and cost estimates for recovery measures. Conservation actions identified in WRIA plans for King County watersheds are now being implemented subject to available funding and are anticipated to contribute significantly to the achievement of recovery goals for these species and their eventual removal from the Endangered Species list.

2. Clean Water Act

Protecting the quality and beneficial uses of surface waters is a requirement of the federal Clean Water Act (CWA). Two of the major programs to achieve state and local compliance with the CWA are: the National Pollutant Discharge Elimination System (NPDES) permits for municipal discharges (including wastewater and municipal stormwater), and broader pollutant limits known as Total Maximum Daily Loads (TMDLs).

a. National Pollutant Discharge Elimination System

Authority for administering the NPDES Program has been delegated by the Environmental Protection Agency (EPA) to the Washington State Department of Ecology (Ecology). King County must comply with NPDES permit conditions for individually permitted activities, such as construction site activities or wastewater discharges, and for discharges from its municipal stormwater system that are regulated under a general municipal stormwater permit. A new Phase I general municipal stormwater permit was issued in January of 2007 for a term of five years. The new permit contains prescriptive requirements for controlling and monitoring pollutants in municipal stormwater. The permit conditions are now under challenge, and it is not known at this time whether the requirements will be modified as a result of the challenge.

b. Water Quality Standards and Total Maximum Daily Loads

The Federal Clean Water Act (CWA) and Washington State law require the state to develop standards for surface and groundwater and for sediments collectively known as "Water Quality Standards" (WQS). These standards are intended to ensure that our waters can be beneficially used for purposes we all value, like fishing, swimming, boating, and drinking, as well as industrial and agricultural purposes and fish habitat.

Additionally, the state must prepare a list of water bodies that do not meet WQS. This list, known as the Water Quality Assessment (WQA), is prepared for Washington State by Ecology, and must be submitted to the EPA every two years. The water bodies in Category 5 of this list consist of "water quality limited" or "impaired" estuaries, lakes, rivers and streams that fall short of state surface water quality standards, and are not expected to achieve standards after implementation of technology-based controls. These standards are intended to ensure that our waters can be beneficially used for purposes we all enjoy, from fishing, swimming, boating, and drinking to industrial and agricultural purposes, and fish habitat. The beneficial uses that are intended to be protected by water quality standards are those that have existed or could have existed in the waterbody from November 1975 or later.

For water quality impaired waters on the Category 5 list, EPA requires that states establish a Total Maximum Daily Load (TMDL) for each. A TMDL, also called a water cleanup plan, analyzes how much pollution a water body can receive and still support its assigned beneficial uses. The cleanup plan also includes a strategy for controlling pollution and monitoring requirements to test the plan's effectiveness. TMDL's potentially affecting unincorporated King County have been approved by EPA for the Snoqualmie River, Lake Ballinger, Pipers Creek, Issaquah Creek, Cottage Lake, Lake Fenwick, Lake Sawyer, and the Duwamish River and Lower Green River. A complete listing of TMDLs and the WQA list can be found on Ecology's web site at <http://www.ecy.wa.gov>
http://www.ecy.wa.gov/programs/wq/links/wq_assessments.html.

E-110 Surface waters designated by the state as Water Quality Impaired under the Clean Water Act (water bodies included in Category 5 of the Water Quality Assessment) shall be improved through monitoring, source controls, best management practices, enforcement of existing codes, and, where applicable, implementation of Total Maximum Daily Load plans (TMDLs). The water quality of

~~((all)) other ((state-classified)) water bodies shall be ((maintained)) protected or improved through these same measures, and other additional measures that may be necessary to ensure there is no loss of existing beneficial uses. Any beneficial uses lost since November 1975 shall be restored wherever practicable, consistent with the Federal Clean Water Act.~~

E-111 King County shall evaluate development proposals subject to drainage review to assess whether the proposed actions are likely to significantly increase the loads of pollutants of concern for water bodies that are on the Category 5 List or that have otherwise been identified by King County as being in violation of state water quality standards. Drainage review should also consider whether the proposed action is likely to increase pollutants of concern to a level that would trigger a violation of state water quality standards for the receiving water. The review should consider whether measures to mitigate for the increased pollutants should be required. King County may modify the drainage requirements of development proposals to ensure consistency with TMDLs, to prevent additional discharges to Category 5 waters of the pollutants that are the subject of the listing, and to prevent additional violations of state water quality standards.

3. Growth Management Act and Critical Areas Protection

The ~~((Growth Management Act-))~~~~((GMA))~~ requires that critical areas be designated and protected. Critical areas include wetlands, areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas and geologically hazardous areas. This chapter establishes policies for designating and protecting critical areas. King County Code Title 21A provides the regulatory framework for these policies.

The GMA also requires local governments to include the Best Available Science (BAS) in developing policies and development regulations to protect the functions and values of critical areas, and to give special consideration to the conservation or protection measures necessary to preserve or enhance anadromous (fish that spawn in freshwater and spend part of their lifecycle in salt water) fisheries.

4. Shoreline Management Act

~~((King County's Shoreline Management Master Program (Title 25) of the King County Code is a functional plan developed in compliance with the Washington State Shoreline Management Act of 1971. The master program protects))~~ The Shoreline Management Act (SMA) requires each city and county with Shorelines of the State to adopt a Shoreline Master Program that complies with state guidelines but that is tailored to the specific needs of the community. The SMA applies to all marine waters, streams with a mean annual flow of 20 cubic feet or more per second, and lakes that are 20 acres or more in size ~~((, the marine shoreline of Puget Sound and wetlands associated with these systems))~~. The SMA also applies to upland areas called "shorelands" within 200 feet of these waters, as well as associated wetlands and floodplains. The program's goals are set by state law and include protecting natural resources, increasing public access to shorelines and encouraging businesses such as marinas along the waterfront.

Under the SMA, the Shoreline Master Program includes both a Shoreline Master Plan and implementing shoreline land use and development regulations. The GMA requires that a local government's Comprehensive Plan, Shoreline Master Plan, and development regulations, including both shoreline regulations and critical area regulations must be consistent with each other. King County is incorporating its Shoreline Master Plan into the King County Comprehensive Plan. The Shoreline Master Plan policies are set forth in Chapter 5—Shoreline Management.

~~**(E-128** — **Development within designated shoreline environments shall preserve the resources and ecology of the water and shorelines, avoid natural hazards, promote visual and physical access to the water, protect ESA listed species and their critical habitat,**~~

~~and preserve archeological, traditional cultural resources, shellfish resources, and navigation rights. Protection of critical areas shall take priority over visual values and physical access.))~~

II. Climate Change

Arguably the single most pervasive environmental challenge that King County faces now and into the future is global climate change. As greenhouse gas (GHG) emissions cause local and global temperatures to rise, two of the primary anticipated effects are increases amount of precipitation falling as rain and simultaneous decreases in annual snow pack. These two impacts alone have the potential to dramatically impact ecosystems, agriculture, economy, biodiversity, and public health and safety in myriad and interrelated ways. Sustaining quality of life and our environment will require a significant commitment on the part of King County to both reducing GHG emissions and adapting to the climate change impacts in an ever-changing and increasingly dynamic landscape.

Predicted impacts to the Pacific Northwest and King County include:

- Increased average annual temperatures, increased temperatures across all seasons, significantly increased summer temperatures, and increased urban “heat island” effects, in which urban air and surface temperatures are higher than in the Rural Area due to storage of heat in pavement and buildings;
- Sea level rise of approximately 1 foot by 2100 leading to increased coastal flooding, inundation, saltwater intrusion of coastal aquifers, nearshore habitat loss, and erosion;
- Changes to the timing and magnitude of streamflows due to snowpack and glacier reduction, increased winter rainfall, decreased winter snowfall, and earlier spring melt;
- Increased stress to regional water supplies due to increased frequency of drought events and increased demand;
- Negative effects on public health including thermal stress, respiratory problems due to increased smog, and increased exposure to certain infectious diseases;
- Increased stress to forests in the foothills, and potentially increased growth in forests at higher elevations that were snow-dominated;
- Increased stress to plant and animal species due to vegetation changes, food web disruption, streamflow changes, and increased freshwater and marine water temperatures; and
- Altered regional distributions of many species, including marine and freshwater phytoplankton, zooplankton, and salmonids.

King County is a relatively small contributor to global and even national climate change, accounting for roughly a quarter of statewide greenhouse gas emissions and about one half of one percent of United States emissions. However, King County has a responsibility to do its part to reduce carbon emissions through its land use planning, transportation investments, energy purchasing practices, building standards, operation of facilities like sewage treatment plants, and monitoring and assessment programs. In doing so, the county can serve as a role model for other counties across the country.

Even if all greenhouse gas emissions ceased today, global and regional temperatures would continue to increase. King County must be proactive in adapting to the global climate change impacts that will affect this area regardless of the local steps we take to reduce emissions. This includes preparing for more frequent and severe flooding and droughts, developing capacity for reclaimed water, working with farm and forest owners to address climate change impacts, and taking steps to improve the resiliency of our natural environment.

A. Assessment

King County has completed regular inventories and assessments of greenhouse gas emissions since 2000. These assessments have provided valuable information to inform decisions about actions that will have the most impact on climate change, and to monitor progress toward meeting emissions reduction goals.

Emissions inventories have become even more important as businesses and local governments make commitments to targeted reductions in greenhouse gas emissions. In 2006, King County joined the Chicago Climate Exchange (CCX). CCX is the largest carbon exchange in North America. Participants make binding commitments to reduce emissions below certain targets. If they exceed the reduction target, they can sell carbon credits. If they fall short of the target, they must purchase credits. In joining CCX, the county made a binding commitment to reduce carbon emissions by six percent compared to 2000 levels by 2010. CCX requires third party validation of emissions reductions.

Accounting for GHG emissions from the many facets of municipal operations including transit, fleet, solid waste, wastewater treatment can be more complex than calculating emission from a single industry. For example, when evaluating the contribution of public transit to GHG emissions, it is important to consider not only actual transit emissions, but also the emissions from single occupancy vehicles that are avoided when people use transit.

E-201 King County shall complete and update its greenhouse gas emissions inventory on a regular basis using established greenhouse gas emissions accounting protocols, and should work with local and state governments to account for greenhouse gas emissions in the evaluation of regional investments.

E-202 King County shall collaborate with other local governments regionally, nationally and internationally to develop a common approach to accounting for greenhouse gas emissions from municipal operations.

E-203 King County should continue to collaborate with experts in the field of climate change, including scientists at the University of Washington's Center for Climate Change, to monitor and assess the impacts of climate change in King County.

B. Mitigation

King County produces only a small fraction of national and global GHG emissions. King County recognizes, however, that it has a responsibility to be a leader for its citizens and to provide support for others in reducing greenhouse gas emissions. King County government must do its part to help reduce global GHG emissions.

In King County, GHG emissions from the transportation sector are the single biggest source of global warming pollution, and the single biggest factor in the amount of transportation pollution is the number of miles traveled in personal vehicles (sometimes referred to as single occupancy vehicles).

King County, through its operations and land use authorities, can mitigate its impacts on GHG emissions in several ways:

- Land use designations and zoning can influence the pattern and density of development and the level of reliance on single occupancy vehicles;
- Building codes and facilities standards can influence the types of building materials and future energy demands;
- Purchasing practices can affect emissions from energy and fuel production and use;
- Modifying operations of county buildings and facilities can reduce emissions and resource demand;
- Undertaking energy co-generation projects at King County's wastewater treatment and solid waste disposal facilities can reduce greenhouse gas emissions and produce renewable energy; and
- Protecting forested areas, encouraging and supporting active stewardship, and undertaking reforestation projects can aid in carbon sequestration.

In March 2006, the Executive issued Executive Orders on Global Warming Preparedness that directed King County to reduce greenhouse gas emissions and prepare for anticipated climate change impacts. In

October 2006, the King County Council passed Motion 12362 calling for development of a Global Warming Mitigation and Preparedness Plan. The Executive completed the "Climate Plan" in February 2007. The Climate Plan includes recommendations for climate change mitigation and adaptation throughout all facets of county operations, including management of wastewater treatment plants and other county facilities, investments in infrastructure, priorities for county-funded monitoring and research, planning for land use and transportation, participation in water supply planning efforts, flood hazard management, and collaboration with other governments and institutions to identify climate change impacts. The Climate Plan can be accessed at: <http://www.metrokc.gov/exec/news/2007/pdf/ClimatePlan.pdf>

E-204 King County's operations and actions associated with management of county-owned facilities, investments in infrastructure, land use planning, environmental protection programs, participation in salmon conservation and water supply planning efforts, and other climate changes actions carried out by King County staff should be carried out in accordance with the King County Climate Plan.

E-205 King County shall seek to reduce net carbon emissions from county operations by six percent below year 2000 emissions by the year 2010.

E-206 King County shall maximize the creation of resources from waste products from county operations such as gases produced by wastewater treatment and solid waste disposal in a manner that reduces greenhouse gas emissions and produces renewable energy.

E-207 King County shall evaluate development proposals subject to the State Environmental Policy Act (SEPA) for their greenhouse gas emissions. King County may exercise its substantive authority under SEPA to condition or deny development proposals in order to mitigate associated individual or cumulative impacts to global warming.

E-((145))208 King County should encourage its electricity suppliers to provide energy efficiency, renewable energy and mitigation for electricity sources that are powered by natural gas and coal. In addition, King County should encourage the state to require new fossil fuel power plants to mitigate for their carbon dioxide emissions.

E-209 King County should ensure that its land use policies, development and building regulations, technical assistance programs, and incentive programs support and encourage the use of passive and active solar energy as a no-emission alternative to traditional energy sources.

E-((146))210 King County will continue to evaluate its own maintenance and operations practices, including procurement, for opportunities to reduce its own emissions or emissions produced in the manufacturing of products.

C. Adaptation

Anticipation of environmental change has enabled institutions and societies to adjust and adapt in the past. Although some aspects of future climate change in the Pacific Northwest are well known, others are less certain. However, based on the potential consequences and impacts to public health and safety, the environment, and economic prosperity in the King County region, the county needs to take precautionary action now to increase resiliency of our natural and built systems to climate change impacts using the best information available.

King County can increase resiliency and adapt to climate change through:

- Coordinated public health and disaster planning;

- Climate-sensitive land use planning;
- Investments in flood hazard management projects;
- Collaborative planning with water suppliers and development of reclaimed water sources;
- Comprehensive approaches to conserving biodiversity that may make habitats more resilient to climate change impacts;
- Information sharing and collaboration with other local governments developing strategies for climate change adaptation; and
- Cooperation with farm and forest land owners to identify and address impacts of climate change.

As a region on the front lines of climate change impacts, King County and its partners are already beginning to implement and learn from practical preparedness steps. Effective climate change mitigation and adaptation actions will require a high degree of coordination among state, regional and local governments, academic institutions, business leaders, and King County residents.

E-211 King County should take steps to raise awareness about climate change impacts and should collaborate with climate science experts, federal and state agencies, and other local governments to develop strategies to adapt to climate change.

E-212 King County should collaborate with climate scientists, federal and state agencies, and other local governments to evaluate and plan for the potential impacts of coastal flooding associated with sea level rise.

E-213 King County should consider projected impacts of climate change, including more severe winter flooding, when updating disaster preparedness, levee investment, and land use plans, as well as development regulations.

E-214 King County should collaborate with climate scientists in order to increase knowledge of current and projected climate change impacts to biodiversity.

E-215 King County should consider projected impacts of climate change on habitat for salmon and other wildlife when developing long-range conservation plans and prioritizing habitat protection and restoration actions.

Additional policies related to green building standards can be found in Chapter 2—Urban Communities. Additional policies related to climate change mitigation and adaptation strategies for agriculture and forestry can be found in Chapter 3—Rural Area and Natural Resource Lands. Additional policies related to reduction of GHG emissions from transit and fleet vehicles can be found in Chapter 7—Transportation. Additional policies related to water supply, use of reclaimed water, and solar access can be found in Chapter 8—Services, Facilities and Utilities.

D. Collaboration with Others

King County recognizes that the ((global warming)) climate change challenge is worldwide in its scope, and that much of the scientific community believes that potentially far reaching consequences to the environment and to humankind's quality of life may result if this issue is not addressed effectively. King County's actions are important contributors to addressing this issue; however, its global nature will require cooperation across local, regional, state and international boundaries.

King County has collaborated with the state and federal agencies, the University of Washington's Climate Impacts Group, the Center for Clean Air Policy, and the International Council on Local Environmental Initiatives to organize conferences and develop guidebooks and other materials tailored to the operations and authorities of local governments. Most recently, the county kicked off the "Cool Counties for Climate Change Initiative," in which participating counties pledge to reduce greenhouse gas emissions by eighty percent by 2050.

- E-216 King County should work with other local governments through cooperative frameworks like the International Council on Local Environmental Initiatives to develop climate change mitigation tools tailored to local governments.**
- E-217 King County should collaborate with other local governments in the region with the aim of reducing greenhouse gas emissions throughout the region to 80 percent below current levels by 2050.**
- E-218 King County supports the creation of carbon markets based on binding commitments to reduce carbon emissions, common standards for accounting for greenhouse gas emissions and carbon credits, and purchase of carbon credits to offset carbon emissions.**
- E-219 King County shall participate in the Chicago Climate Exchange, including making binding commitments to reduce emissions, and shall encourage participation by other local governments.**

((B. ~~Air Quality~~))

III. Air Quality

A. Overview

~~((1. Overview~~

~~The preservation of clean air is essential to the quality of life enjoyed by residents of King County. Since many of the long-term solutions to air pollution in our region now depend on land use and transportation decisions, King County must assume a more active role in maintaining the region's good air quality.~~

~~Clean, healthy air is a major contributor to the health of the public. The elderly, those suffering from respiratory illness, and young children are especially prone to the harmful effects of air pollutants. People with chronic respiratory problems, such as asthma, are most sensitive to particular forms of air pollution, such as ozone and particulate pollution.))~~

Clean air, free of pollutants, is essential for the day-to-day quality of life and long-term health of county residents. King County has shown critical leadership in forging solutions to air pollution and will continue to do so well into the future.

~~King County works for clean air in partnership with the Puget Sound Clean Air Agency (PSCAA), which has the lead regulatory and monitoring responsibilities for the region in accordance with the Clean Air Act. Underlying drivers of the Clean Air Act include protecting public health, reducing property damage, and generally protecting the environment. Because air quality impacts water quality, a better understanding is needed regarding the input of pollutants via air transport from both local and distant sources. ((PSCAA has a lead role in developing strategies to reduce these emissions throughout the region. King County will continue to work with PSCAA in implementing emissions reduction efforts. King County will monitor the government's own emissions and will work to develop policies and projects to reduce them. Further, as the land use authority for unincorporated King County and the governing body for Metro Transit, King County will consider the air quality in its own policy and planning efforts.))~~

PSCAA is responsible for monitoring and regulating six "criteria air pollutants" using standards set by the EPA. The six "criteria" air pollutants are:

- Fine particulate matter (dust, soot, smoke);
- Ground-level ozone (smog);
- Carbon monoxide (gas primarily from vehicle exhaust);
- Sulfur dioxide (gas primarily from industrial processes like smelters, paper mills, and power plants);
- Oxides of nitrogen; and
- Lead.

PSCAA also focuses on reducing harmful air toxics that come primarily from wood smoke and diesel burning, as well as greenhouse gases such as carbon dioxide and methane from landfills.

~~((The major improvements in air quality result from collaboration and partnerships among public agencies, and between public agencies and private interests. Examples of partnerships include:~~

- ~~Diesel Solutions partnership demonstrating the potential of ultra-low-sulfur diesel fuel;~~
- ~~Creation and implementation of the new rules regarding control of vapors from gasoline pumps at service stations, where collaboration between government and the private sector facilitated the development and are working on the efficient implementation of the rules' provisions;~~
- ~~Three stakeholder processes with businesses, governments and nonprofit to form consensus on implementation policies for ozone, particulates and greenhouse gases.))~~

Efforts to address climate impacts and improve air quality are strongly linked. For example, conversion from conventional to hybrid buses and fleet vehicles not only helps to reduce climate change impacts, but also reduces emissions of particulates. One of the likely impacts of climate change on air quality is an increase in ground-level ozone because higher temperatures enhance the conversion of precursors into ground-level ozone. Ozone can exacerbate asthma and reduce respiratory system functioning. The link between regulation of air quality and climate change has been strengthened by a recent United States Supreme Court decision finding that greenhouse gases fit within the federal Clean Air Act's definition of air pollutants, and that EPA has the authority to regulate greenhouse gases as pollutants.

B. Air Quality and Health

Certain populations, including those living close to roads with high traffic volumes, the elderly, and those with existing chronic illness or disease are considered more sensitive to air pollutants than the general population at large. Immigrant communities, communities of color, and low income communities often live or work in places where their exposure to the six criteria pollutants and other air toxics is disproportionately high compared to the greater population. This is an example of health inequity, which is a major factor in the disability, sickness, and early death rates among different populations.

Children also are considered a sensitive population because their higher metabolic rate and continuing lung development throughout adolescence make them more susceptible to damaging effects of poor air quality. Adverse health effects that can arise from exposure to the six criteria pollutants for all these sensitive populations range from respiratory and cardiovascular illness and disease to low birth weight to certain cancers.

King County has ~~((undertaken))~~ completed a study of how land use planning affects transportation choices and consequently air quality. The Land Use transportation Air Quality and Health study, now referred to as HealthScape, ((will)) provides information on how land use patterns ((can)) affect air quality. The study has found that per capita greenhouse~~((s))~~ gas emissions and regional air pollution decline steadily as housing density and land use mix increases. Information on HealthScape can be found at www.metrokc.gov/healthscape/.

E-301 King County should include a multiple benefit approach incorporating improved air quality and public health, promotion of economic opportunities, and contributions to creating and maintaining high quality natural and built environments in responding to climate change.

E-302 King County should work to reduce air-quality related health inequities and the exposure of sensitive populations to poor air quality through land use and transportation actions.

E-~~((447))~~303 King County, through its comprehensive plan policies and development regulations, should promote healthy community designs that enable walking, bicycling, and public transit use, thereby reducing greenhouse gas emissions and regional air pollution.

~~((2,))~~C. Ozone, Fine Particulate, Toxics

~~((Ozone))~~ Reducing criteria pollutants will continue to be a primary focus for King County. In response to the EPA's new fine particle and ozone standard, which is expected to be adopted in 2008, King County will need to review its strategies to ensure county attainment of these standards. ((Though the region has attained the National Ambient Air Quality Standards, the margin for failing and slipping back into a non attainment status is tight.)) The ozone strategy identified by PSCAA for our region focuses on reducing volatile organic compounds (VOCs). ~~((The PSCAA has stated that volatile organic compounds are the main concern.))~~ Emission of ~~((volatile organic compounds))~~ VOCs results mostly from petroleum refining, use, handling and combustion.

In addition to ozone, ~~((there is a serious health threat from))~~ fine particulates also represent a serious health threat. Diesel emissions are one of the county's largest sources of fine particulate emissions. King County's participation in the ultra-low sulfur diesel (ULSD) program, known as "Diesel Solutions," has made tremendous strides in cleaning up King County Metro's fine particulate emissions. Indoor burning and outdoor burning are a major source of fine particulates.

Lastly, ~~((toxics are becoming an increasing concern for the region))~~ as a large county with a mix of urban and rural land uses, King County will continue to face risks from air toxics. Examples of air toxics include benzene, formaldehyde, mercury, and dioxins ~~((and literally thousands of other air toxics))~~. The air quality impact of toxics ~~((are))~~ cannot be evaluated in isolation. Their greatest health risk comes from their combined effect. National air toxics assessment data indicate that air toxics risks in the Puget Sound region are in the top five percent in the nation.

Local air monitoring data done by the Washington State Department of Ecology indicates that diesel exhaust and wood smoke are key contributors to toxics. King County Metro currently uses a 20 percent blend of biodiesel in 640 of its buses, a feat that helped earn King County national acclaim for having one of the cleanest bus fleets in the U.S. Biodiesel is a naturally grown, alternative fuel source. It's a cleaner burning fuel and therefore substantially reduces air toxics and greenhouse gases.

In 2002, King County Metro became the first transit agency in the U.S. to test articulated hybrid-diesel electric buses. King County Metro currently owns 214 articulated hybrid buses, the largest such fleet in the nation. A National Renewable Energy Lab study found articulated hybrids provide a 30 percent reduction in greenhouse gases and are 40 percent more reliable than diesel fueled articulated buses

Diesel school buses ~~((are of))~~ continue to be a particular concern. A recent study indicated that school children are exposed to toxics levels five to 15 times the exposure to the rest of the population because of the amount of time they spend on and around school buses. The Diesel Solutions Program is now concentrating on cleaning up the emissions from these buses. ~~((As a large urban-rural county, air toxics will continue to be a primary health risk.))~~ Wood smoke is also a leading contributor to air toxics. King County will examine proposals to curtail the impacts of woodstove burning and land-clearing practices in rural parts of the county.

~~((3.))~~ **Greenhouse Gas (GHG) Emissions**

~~Global climate change has and will continue to have local impacts. University of Washington climate scientists predict that the Cascade snowpack will be 50 percent less in as little as 50 years because of regional changes in climate. Likely results from this reduced snowpack are habitat degradation, deforestation from drought and fires, and less water for drinking, irrigation and hydropower generation. Recreational activities of fishing, skiing, boating, and rafting may be significantly curtailed.~~

~~Beyond reduced snowpack, there will likely be coastline erosion from rising sea levels; more droughts and floods from more erratic weather patterns; increased ozone levels from warmer summers; heat-related deaths; and greater infestation of mosquito-related disease and forest pests.~~

~~Strategies to reduce GHG emissions from transportation generally fall into two categories: reduce vehicle GHG emissions and reduce vehicles miles traveled (VMT). For vehicle GHG emissions reductions, again there are two general approaches: use more fuel efficient vehicles or use alternative fuels. For efficient vehicles, Fleet Administration has been buying hybrid vehicles and King County Metro has recently purchased 235 hybrid buses. King County currently is reviewing the possibility of buying alternative fuels. For VMT reductions, King County will continue its work to expand transit service, support demand management and transit-oriented development, as well as variety of other approaches.)~~

~~((4. — King County Actions))~~

~~((In 2001, the King County Council and County Executive directed that there should be an inventory of air pollutants and GHG emissions from King County government operations. In 2002, King County completed its inventory. This inventory will continue to provide the focus for county policies and projects.))~~
The focus of King County air quality improvement efforts is to engage in projects and changed practices ~~((that))~~ to reduce county emissions and promote policies that incorporate consideration of air quality impacts. Motorized vehicle and other fuel burning engines related emissions are the primary source of ozone, fine particulate, toxics and greenhouse gas emissions in King County and therefore should be a primary focus for emissions reduction.

Examples of King County projects aimed at reducing air pollution and GHG emissions include HealthScape, the diesel solutions program and the retrofitting of transit vehicles as well as solid waste and roads vehicles to use ultra-low sulfur diesel; promoting the use of cleaner energy sources such as fuel cells at the Renton Wastewater Treatment Plant, and pursuing all cost-effective energy ~~((conservation))~~ efficiency programs in county facilities to minimize the county's use of fossil-fuel-based energy sources. These projects and changed practices will also serve as key strategies in King County's efforts to mitigate the impacts of its operations on climate change.

~~E-((140))304~~ King County shall work to reduce air pollutants and greenhouse gas emissions from its operations and seek to promote policies and programs that reduce emissions in the region. ~~((Reducing ozone, fine particulates and toxic emissions should be the top priority followed closely by greenhouse gas emissions.))~~

~~((E-111 — Motorized vehicle and other fuel burning engines related emissions are the primary source of ozone, fine particulate, toxics and greenhouse gas emissions in King County and therefore should be the primary focus for emissions reduction.))~~

~~E-((142))305~~ ~~((A reduction in automobile use will have a direct benefit for))~~ King County should reduce automobile-related pollutant emissions through ~~((improving air quality and should include))~~ initiatives such as:

- a. Increased transit services, options and alternatives;
- b. Ridesharing; and
- c. Innovative pricing programs to capture the true cost of driving.

~~((E-113 — Improving vehicle efficiency and after treatment technology, as well as cleaning up petroleum fuels and fuel switching should be key strategies for reducing motorized vehicle related emissions. Such strategies should include:~~
~~a. Support for state and federal initiatives that improve fuel economy and therefore reduce greenhouse gas emissions;~~
~~b. Continued investment into cleaner fuels and related emissions treatment technologies;~~
~~c. Support for alternative fuels where financially practicable.))~~

~~E-((144))306~~ ~~((In addition to motorized vehicle related reductions, the county))~~ King County should support initiatives that reduce emissions due to indoor and outdoor wood burning consistent with the actions of PSCAA to control this source of public health threat.

~~E-((148))307~~ King County will continue to actively develop partnerships with the Puget Sound Clean Air Agency, local jurisdictions, the state, and public, private, not-for-profit groups to promote programs and policies that reduce emissions of ozone, fine particulates, toxics, and greenhouse gases, particularly for those populations already experiencing health disparities linked to air quality.

More detailed policies related to reducing emissions from automobiles and county operations can be found in Chapter 7—Transportation and Chapter 8—Services, Facilities and Utilities.

~~((C. Water Resources))~~

IV. LAND AND WATER RESOURCES

A. Biodiversity

1. Overview

Because of its size, topography, and geology, the diversity of landscapes and habitats in King County is dramatic. From the Cascade Mountains to Puget Sound, alpine areas to lowland bogs, King County possesses an astonishing array of habitats and species. Approximately 220 species of breeding and non-breeding birds are usually seen on an annual basis in King County. Based on an analysis by the State of Washington, 69 species of mammals, 12 species of amphibians, and 8 species of reptile are thought to be breeding in the county. About 50 species of native fish (and 20 species of introduced fish) are found in the freshwater streams, rivers, ponds, and lakes of King County. In the county's marine environment, over 200 species of fish, some 500 species of invertebrate animals, and 8 species of marine mammals can be found. 1,249 (383 introduced) species of vascular plants have been identified in the county. The diversity of geography combined with King County's history of land use has shaped the biodiversity of the past, present, and will continue affecting it into the future.

King County defines biodiversity as the variety of living organisms considered at all levels, from genetic diversity through species, to higher taxonomic levels, including the variety of habitats, ecosystems, and landscapes in which the species are found. The Washington Biodiversity Council provides another working definition: Biodiversity is the full range of life in all its forms, including the habitats in which they live, the ways species interact with each other and their environment, and the natural processes (like flooding) that support those interactions.

The biggest threats to biodiversity in King County visible today are habitat loss and fragmentation due to development, invasive plant and animal species, and climate change.

2. Climate Change and Biodiversity

The Pacific Northwest may experience slightly less dramatic effects from climate change than the subarctic and arctic areas of the continent. Nevertheless, the effect on native biodiversity is likely to be serious and somewhat unpredictable. In King County, some effects already are apparent as average temperatures over the last decade have increased slowly but steadily, especially in winter. For many of our native species, climate change will be an added stress to ecosystems and populations. The following effects are predicted to affect biodiversity in King County:

- Increases in direct mortality as a result of thermal stress: For many freshwater species, especially the salmonids and the freshwater mollusks, warming stream and lake temperatures may impose an added physiological burden that increases direct mortality.
- Increases in productivity due to altered environmental regimes: As temperatures warm, some ecosystems such as lakes and wetlands may experience increases in primary productivity that will alter the species composition of plants and animals.
- Altered growth rates: Temperature often controls much of the physiological response of animals, especially cold-blooded animals such as salmon. Warmer water temperatures during incubation will likely increase the rates of development of embryos and juveniles and could alter the timing of emergence and out-migration, which may not coincide with adequate food supplies.
- Altered local distributions: Warming stream temperatures over the last decades may have already altered local distributions of certain of our cold-water species of salmon and char. Some early evidence suggests that local spawning patterns of steelhead and bull trout may be shifting upward (to higher elevations) in watersheds where these species are found. Other species that may be susceptible to this effect are freshwater mollusks of the genera Margaritifera and

Anodonta. The same effect is likely for some alpine species of plants and animals that may experience conditions that drive an upward shift in distribution.

- Regional range shifts: This effect is a significant issue for certain species that are at the southern limit of their ranges. In particular, sockeye salmon in the Lake Washington system may be at risk as ocean temperatures rise and the colder water areas of the northeastern Pacific are pushed northward. This could cause a collapse of the sockeye's range northward some 1000 kilometers.
- Biological invasions: several groups of animals and plants are highly mobile and can reproduce quite quickly if conditions permit. There is some evidence that many of the exotic marine fishes that have been observed with more frequency off Washington's coast and in the Strait of Juan de Fuca are likely candidates to move into Puget Sound as warming progresses. Many of the invasive freshwater fishes in King County are warmwater fishes and are likely to increase in abundance and distribution as lakes and streams warm.
- Altered timing of life history events such as migration and breeding: Because the migrations and breeding of most animal species are keyed to seasonal signals of light and temperature, changes in these patterns may be expected in the county as elsewhere. This effect will be critical for salmon and trout, whose migratory patterns, breeding times, and emergence and out-migrations are keyed to river flow and temperature. If these environmental cues are temporally displaced, the life history patterns of many species will respond accordingly, and the direction of this response may not assure the survival of the species.
- Food web disruptions: This effect has already been observed in Lake Washington as a breakdown of certain parts of the phytoplankton-zooplankton food web, and such food web effects may be taking place in other county lakes as well. The possibility of this effect in King County's marine ecosystem is of great concern.

The effects of climate change are only beginning to be observed and understood in the county and are presumed to increase over time. In the face of climate change, biodiversity conservation may be of critical importance for buffering the effects of rising temperatures on regional ecosystems, damping the rates of ecological change, and reducing the potential for sudden, extreme changes in the environment.

3. Principles for Biodiversity Conservation

The following principles are based on current approaches to conservation biology and restoration ecology. They provide guidance for management of the county's natural resources to best conserve and restore native biodiversity.

a. Landscape Context

Natural resource protection occurs within an ecological context. Environmental management should consider not only the immediate site but also the context that surrounds it. Different activities will require consideration of different scales—from small sub-basins of a few square miles to watersheds and ecosystems that contain many hundreds or thousands of square miles. For example, watershed boundaries are useful ways to define ecological planning units for resource protection of aquatic systems while large-scale vegetation communities may be more useful for terrestrial systems.

There is no single scale appropriate for all planning and management of conservation activities. Management within the context of a landscape helps to ensure the actions in one area will not be undone or rendered unsustainable by conditions in the surrounding watershed or ecoregion. Further, conservation efforts designed to protect only one species could have an unintended, detrimental effect on others.

E-401 King County's conservation efforts should be integrated across multiple landscape scales and species.

E-402 King County should carry out conservation planning efforts in close collaboration with other local governments, tribes, state and federal governments, and land owners.

E-403 King County should develop a biodiversity conservation framework and conservation strategy to achieve the goals of maintaining and recovering native biodiversity. This framework should be coordinated with the Washington Biodiversity Conservation Strategy where applicable.

“Ecoregions” are land areas that contain a geographically unique set of species, communities, and environmental conditions. Washington is a highly diverse state, with portions of nine ecoregions located within its boundaries. Three ecoregions cover parts of King County: the Puget Lowland Ecoregion in the western half of the county, the North Cascades Ecoregion in the northeastern and east central portion, and the Cascades Ecoregion in the southeastern portion of the county. The Puget Sound Marine Environment is not included in this land-based system of Ecoregions, but is functionally linked and includes backshore habitats, intertidal and subtidal habitats, estuarine habitats, and open water.

Ecoregions are the largest units of biodiversity in King County, and this scale is appropriate for broader natural resources planning and management. More localized habitats and species can be identified within these ecoregions, and can inform actions at the watershed and even property-specific level.

E-404 King County should develop a countywide landscape characterization system based on ecoregions as a basis for assessing, protecting, and recovering biodiversity.

b. Hierarchy for Management, Protection, and Restoration

Ecosystems and habitats suitable for particular species are the result of various geologic, hydrologic, and biologic processes. An example is seasonal flooding that causes erosion and deposition of gravel critical for salmon spawning and provides a cue for migration. Where habitat forming processes are intact, ecosystems and their inhabitants are more likely to persist in the face of environmental variation.

Sustaining watershed processes is a key consideration underlying any restoration or management action on the land. For example, stormwater management practices that help to mitigate the impacts of development on the rate and volume of runoff are critical if more localized habitat restoration projects downstream are to succeed.

In a developed environment, it is not always feasible to restore natural processes and functions. For example, the location of a highway may prevent removal of a flood protection levee and restoration of natural side channel habitat. In this case, restoration and management actions should focus on mitigating the continuing impacts of prior actions by restoring functions to the extent practicable and consistent with other legal requirements.

Restoration and management activities should follow this hierarchy:

1. Maintain and restore basic ecological processes (example: protection and restoration of forest cover to maintain hydrologic processes);
2. Maintain and restore ecological structure if restoring processes is insufficient (example: replacement of large trees and logs along and in river channels in a manner consistent with public safety requirements);
3. Maintain and restore ecological function (example: revegetation to provide shade and cover for fish and wildlife or construction of stormwater facilities to slowly release flood water);
4. Maintain and restore particular ecosystem attributes, habitats, and species (example: artificial placement of spawning gravels below a dam or out-planting of salmon).

E-405 **King County's efforts to restore and maintain biodiversity should place priority on protecting and restoring ecological processes that create and sustain habitats and species diversity.**

E-406 **King County should conserve areas where conditions support dynamic ecological processes that sustain important ecosystem and habitat functions and values. These areas include stream confluences, headwaters, and channel migration zones.**

c. Information to Guide Action

Both current and historical information on habitat conditions and species distribution can inform ecologists and decision-makers about environmental management decisions. Historic information can provide information about the cycles and timing of events that produced current habitat patterns and species distribution, and can provide clues to reversing declines. Historic information can also provide valuable information about historic and future public safety hazards, including the location of historic river channels and the likely magnitude of future floods.

E-407 **King County should use a mixture of information on historic, current, and projected future conditions to provide context for managing public hazards and protecting habitat.**

Decision-makers do not always have access to complete or certain information. Where there is a significant risk of damage to the environment, precautionary action informed by the best available science should be taken to limit that damage.

E-408 **King County should take precautionary action where there is a significant risk of damage to the environment. Precautionary action should be coupled with monitoring and adaptive management.**

d. Rare Ecosystems, Habitats, and Species

Rare or sensitive habitats and species are at a greater risk of extinction than those that are widespread and abundant and therefore should be the highest priority for conservation. An important secondary benefit of protecting habitat for rare, endemic (native to a particular area), or keystone (a species that is central to the survival of a multitude of other species) species is that habitat for many other species is protected as well. For example, the most effective way to protect and enhance native salmonid populations is through protection of those river and stream channels, riparian corridors, lakes, wetlands, groundwater, headwaters, and watersheds that provide or impact spawning and rearing habitat, food resources, and fish passage. Protecting these resources also enhances protection of habitat for other species.

E-409 **Activities that may harm rare species, habitats, and ecosystems should be undertaken cautiously, if at all.**

E-410 **King County should assess the relative scarcity of different land types and resources, the role of these lands in supporting sensitive species, and the level of threat to these lands in terms of habitat modifications that would likely reduce populations of sensitive species.**

E-411 **King County should give special consideration to protection of rare, endemic, and keystone species when identifying and prioritizing land areas for protection through acquisition, conservation easements, and tax incentive programs.**

e. Time Scale for Evaluating Environmental Protection Actions

Habitat conditions and populations can fluctuate over long-time periods in relationship to population cycles, climate change, and major events like floods and fires. It may take decades to see the results of habitat restoration projects and other environmental management actions on populations.

E-412 Knowledge of ecological patterns and time scales should inform conservation, monitoring, and other management actions.

f. Integration of Land and Water Management and Planning

In the past, aquatic and terrestrial habitats and species have often been managed independently of each other. Effective conservation and resource management of aquatic and terrestrial systems requires coordinated planning among departments with authority over development regulations and guidelines, wastewater treatment, stormwater management, flood hazard management, groundwater protection, transportation planning and road building, water quality, natural resource management, and fish and wildlife conservation. Effective conservation planning must include the interests of private landowners as well.

Coordinated planning and management can improve understanding of cumulative effects on terrestrial and aquatic systems, and can allow for a systems-based approach to avoiding or mitigating for adverse effects and improving habitat functions and value over time.

E-413 King County's land use planning, regulatory, and operational functions related to environmental protection, public safety, and equity should be closely coordinated across departments to achieve an ecosystem-based approach.

g. Non-Native Species

Non-native species are often invasive because they did not evolve as part of the ecosystem and therefore do not have natural controls or competition. These species may be terrestrial, freshwater, or marine. Invasive species can create costly maintenance problems for both public and private landowners. Noxious and invasive weeds and animal species pose threats to the environmental health of all landscapes in King County, including natural, agricultural, wildlife, wetland, stream, and recreational areas. Weeds spread in a variety of ways, including the transport of seeds or plant parts by vehicles (tires, boats), shoes, clothing and animals (including pets, livestock, wildlife, birds and insects), in soil, gravel and other landscaping and building materials, down watercourses and in floods, by wind, and occasionally through unintentional or deliberate introduction by people. They alter ecosystems through disrupting food chains, out-competing native species, and reducing habitat for native wildlife. Invasive species, including weeds, are widely recognized as having a significant negative impact on wildlife biodiversity.

King County offers technical assistance with identification and removal of non-native plants through programs like Forest Stewardship, Rural Stewardship Planning and Naturescaping. The county also partners with volunteer groups to remove invasive plants from open space and natural areas. Some non-native species are classified as "noxious" weeds. The King County Noxious Weed Control Program provides many services to county residents, including: educational materials and workshops, current information on control and eradication of noxious weeds, support to volunteer and land owner groups, and annual road-side surveys. In addition, the Noxious Weed Control Program implements the State Weed Law (RCW 17.10) in the county which requires all landowners to eradicate Class A noxious weeds and control designated class B and county-selected Class C noxious weeds on their properties.

The State Weed Law applies to both private and public lands. King County manages approximately 4,000 parcels of public land totaling 32,100 acres. King County also owns or manages 1,800 linear miles of roads and right of way. These lands are managed by multiple county agencies, including the King County Departments of Natural Resources, Transportation, and Executive Services. Since weed infestations can spread from property to property, on both public and private lands, it is critical that the

county have a coordinated strategy for controlling noxious and invasive weeds on county-owned and managed lands.

E-414 **Introductions of non-native, invasive plant, vertebrate, and invertebrate species should be avoided in terrestrial, freshwater, and marine environs.**

E-415 **On county-owned lands, King County should use locally adapted native species for natural area landscaping, restoration, rehabilitation, and erosion control. Habitat restoration projects should include provisions for adequate maintenance of plantings to prevent invasion of weeds and ensure survival of native plantings.**

E-416 **King County should promote and restore native plant communities where sustainable, feasible, and appropriate to the site and surrounding ecological context.**

E-417 **King County should provide technical assistance and incentives for private landowners who are seeking to remove invasive plants and noxious weeds and replace them with native plants.**

E-418 **King County shall develop a coordinated strategy for preventing, monitoring and controlling infestations of state-listed noxious weeds and other non-native invasive weeds of concern on county-owned and managed lands.**

h. Adaptive Management

Adaptive management refers to adapting or modifying management actions based on ongoing monitoring results. To sustain native biodiversity and improve our efforts at conservation, we must always be advancing our understanding of the systems under our care.

E-419 **Management activities should, when feasible and practicable, be designed in a manner that can test management objectives.**

Additional text and policies related to monitoring and adaptive management can be found at the end of this chapter.

B. Upland Areas

1. Stormwater Quality

Rivers, streams, lakes and wetlands must be protected from the adverse impacts of urbanization and land use to continue functioning in a beneficial manner. Because urbanization both increases ~~((stormwater))~~ runoff from storms and reduces streamflows in dry months by limiting infiltration, control of the quantity and quality of stormwater runoff is critical. Unmitigated stormwater runoff can cause erosion, sedimentation and flooding with resulting adverse impacts on water quality, fish and wildlife habitat, property and human safety. In addition, stormwater runoff can carry pollutants such as oil, heavy metals, fertilizers, herbicides, pesticides and animal wastes into waters. Sedimentation from soil disturbed by clearing, grading, farming and logging can reduce river or stream channel capacity, fill lakes and wetlands, and smother aquatic life and habitat.

Methods of stormwater management include clearing restrictions, retention/detention, low((-)) impact development methods, discharge and infiltration standards, and best management practices.

E-((439))420 **Stormwater runoff shall be managed through a variety of methods, with the goal of limiting impacts to aquatic resources, reducing the risk of flooding, protecting and enhancing the viability of agricultural lands and promoting groundwater recharge. Methods of stormwater management shall include temporary erosion and sediment**

control, flow control facilities, water quality facilities as required by the Surface Water Design Manual, and best management practices as described in the Stormwater Pollution Control Manual. Runoff caused by development shall be managed to prevent adverse impacts to water resources, forests, and farmable lands. Regulations shall be developed for lands outside of the Urban Areas that favor nonstructural stormwater control measures when feasible including: vegetation retention and management; clearing limits; limits on actual and effective impervious surface ((and impacting impervious surface)); low-impact development methods that ((disburse)) minimize direct overland runoff ((into native vegetation)) to receiving streams; and limits on soil disturbance.

2. Forest Cover

Forests absorb and slowly release rainwater to streams and aquifers, filter runoff, and provide food, shade, and cover for wildlife. In doing so, they help to prevent flooding and erosion, protect drinking water, and support fish and wildlife and their habitat. Therefore, it is important that regulations protecting critical areas like wetlands take into consideration both regulations and incentives programs intended to protect forest cover in upland areas. Forests in rural King County are also relied upon for recreation and resource use, including harvest and firewood collection. Rural Stewardship and Forest Stewardship Plans provide mechanisms for tailoring regulations and best management practices for forest management to individual properties. Completion of one of these plans can also qualify landowners for tax incentive programs and streamlined permitting.

E-421 King County recognizes that protecting and restoring headwater and upland forest cover is important for preventing flooding, improving water quality, and protecting salmon and other wildlife habitat. The central role that forest cover plays in supporting hydrologic and other ecological processes should be reflected in policies and programs addressing stormwater management, flooding, wildlife, and open space.

E-422 King County's critical areas and clearing and grading regulations should provide for activities compatible with long-term forest use, including use of recreational trails, firewood collection, forest fire prevention, forest management, and control of invasive plants.

E-423 King County recognizes the value of trees and forests in both rural and urban communities for benefits such as improving air and water quality and enhancing fish and wildlife habitat. The county promotes retention of forest cover and significant trees using a mix of regulations, incentives, and technical assistance.

3. Soils and Organics

Soils play a critical role in the natural environment. Healthy soils keep disease-causing organisms in check, moderate runoff, recycle and store nutrients, and ((provide an important medium for air and water to pass through)) are the basis for forest and agricultural fertility. More recently, the carbon storage properties of soils have been recognized as a major climate-moderating influence. The properties of a healthy soil are similar to those of a sponge, faucet and filter. They soak up and store water, naturally regulate the flow of water, and bind and degrade pollutants. The presence of millions of macro and microorganisms in soil creates a ((“))vibrant soil culture((“)) where organic material is consumed and air and water are retained. Nutrients are made available to plants to allow healthy root growth and oxygen generation.

It is common for healthy native soils to be removed during land development. Even when soils are not removed, development and other human activity often causes soil compaction, removal and erosion of healthy, native soils. Fewer organisms are present in disturbed soils. The resulting decrease in organic

matter inhibits the soil's ability to hold water, which increases surface water runoff. In addition, plants can not thrive in disturbed soils because of the lack of nutrients. This, in turn, causes people to use more chemical fertilizers, pesticides, and water to induce plant growth. The combination of increased runoff and increased fertilizer and pesticide use results in greater water pollution downstream.

Increasing the organic content in disturbed soils can help restore their environmental function. Composted organic materials that might be used include yard debris, food and wood wastes, soiled paper, biosolids and/or livestock wastes, but not others, such as fly ash from industrial smokestacks. Benefits of incorporating composted organic materials in soils include: improving stream habitat, supporting healthier plants, reducing runoff, and closing the recycling loop for organic materials. The transformation of degraded soils to enhance their ability to uptake and store carbon may be the one of the most effective actions that can be taken to mitigate the near-term effects of climate change.

~~((Organic soil content can be increased during the development process. Typically, in a new development, topsoil is removed, and then later replaced. Developers can incorporate composted organic materials during the construction process by replacing removed topsoil with organics in areas to be landscaped to mitigate the impacts of development.))~~ It is preferable to leave native soil and vegetation in place as much as possible so that it can continue to provide the benefits of natural soil functions. Where soil is disturbed or removed, soil function can be improved by providing soil with adequate depth and organic matter content.

E-~~((184))~~424 Conservation of native soils should be accomplished through various mechanisms to ensure soils remain healthy and continue to function as a natural sponge and filter, minimizing erosion and surface water runoff. Native soils and vegetation should be left undisturbed and protected during construction as much as possible. Where soil disturbance is unavoidable, native soils should be ~~((retained))~~ stockpiled on site and reused on site in accordance with best management practices to the maximum extent possible.

E-~~((185))~~425 King County shall require the use of ~~((O))~~ organic matter to restore ~~((should be used in))~~ disturbed soils ~~((, such as those found in developed areas, and shall be increased through various mechanisms))~~ on site developments.

Salmon play an important role in sustaining the productivity of soils in riparian and floodplain areas. Salmon mature in saltwater environments and then spawn and die in their original spawning streams. In doing so, salmon transport nutrients back to watersheds that eventually become available to vegetation.

E-426 The role of salmon in transferring nutrients and maintaining the productivity of riparian and floodplain soils should be incorporated in the development of salmon and soil conservation plans.

Organics comprise a large portion of the waste generated by King County residences, businesses and farms. This organic waste stream requires significant solid waste, farm management, and wastewater treatment resources. Many of these "waste materials" (yard debris, food and wood waste, soiled paper, biosolids, and agricultural livestock wastes), can be recycled and reused to provide numerous uses that are beneficial to the environment and the economy.

King County has a long history of resource conservation and waste recycling. Programs have successfully captured organic materials for beneficial use such as yard debris, recycling and biosolids applications to farms, forests and composting. However, large volumes of yard debris and food scraps continue to be ~~((thrown away))~~ disposed of in the landfill. Significant volumes of livestock waste generated in the suburbs and rural areas are inadequately managed, which can adversely impact water quality and fish habitat.

Although efforts are underway to increase the amount of organic materials that are recycled, the region still lacks the capacity to process all of these materials. Along with its efforts to promote beneficial use of

these products, King County is working with organic material processors and others to try and increase the processing capacity in the region. ~~((The challenge will be for King County to secure funding sources to ensure that sufficient processing capacity is in place to handle a variety of organic waste materials.))~~

E-~~((486))~~427 King County ~~((should))~~ **shall** implement programs to improve availability and markets for organic materials for soils that have been disturbed by new and existing developments.

E-~~((487))~~428 King County shall regard the region's organic waste materials as resources which should be reused as much as possible, and minimize the disposal of such materials.

E-~~((488))~~429 King County shall identify long-term options for expanding the organic waste material processing capacity in the county **in order to provide alternatives for management of manure, food waste, and wood, and to increase the availability of organic soil amendments.**

King County seeks to divert as much material as possible from disposal to reduce overall costs of solid waste management, conserve resources, protect the environment, and strengthen the county's economy (see Chapter ~~((7,))~~ 8—Services, Facilities and Utilities, Policy F-255). In many cases, organic materials can be recycled into a beneficial, highly valued resource helping to meet these diversion goals. Beneficial uses of organic materials include, but are not limited to, the following: soil amendment, mulch, and erosion control.

King County recognizes that in most cases, the best management method for yard debris and livestock wastes is to compost it on the property where it is generated. Examples of residential onsite yard debris management techniques include grasscycling (leaving the grass on the lawn when it is cut) and backyard composting.

E-~~((489))~~430 King County shall promote, ~~((and))~~ **encourage, and require, where appropriate, the beneficial use of organic materials, including but not limited to their use in the following activities: agriculture and silviculture; road, park and other public project development; site development and new construction; restoration and remediation of disturbed soils; nursery and sod production; and landscaping. For these purposes, ((O))organic materials do not include fly ash.**

E-~~((490))~~431 King County agencies shall use recycled organic products, such as compost, whenever feasible **and promote the application of organic material to compensate for historic losses of organic content in soil caused by development, agricultural practices, and resource extraction.**

E-432 King County will seek to enhance soil quality, and protect water quality and biodiversity across the landscape by developing policies, programs, and incentives that support the goal of no net loss of organic material.

Biosolids are the nutrient rich organic product from the wastewater treatment process which can be recycled as a soil amendment. At King County's wastewater treatment plant, solids are removed from the wastewater and treated in large digesters where the organic solids are stabilized, reducing the volume by half. After digestion, a portion of water is removed, leaving the semisolid material ready for recycling.

The Biosolids Management Program emphasizes beneficial use of the resource and pursues environmental stewardship through diverse public-private partnerships. One hundred percent of county biosolids are beneficially used through the forestry and agriculture programs. A portion of the biosolids are composted as a Class A product.

E-((194))433 King County should explore ways to beneficially use biosolids, whenever feasible, locally.

Supporting agriculture is a key growth management strategy and vital to quality of life for King County residents (see Chapter 3: "Rural ((Legacy)) Area and Natural Resources Lands"). However, improper livestock management practices can have significant adverse impact on surface water, groundwater and air quality.

On-farm composting as a method of managing livestock waste and other organic waste materials is becoming an important waste management strategy for farmers. Benefits of on-farm composting include:

- Additional revenue from the sale of compost;
- Reduced costs for water, fertilizers and pesticides, due to reduced water usage and reduced reliance on fertilizers and pesticides;
- Reduced impacts to surface waters; and
- Increased crop yields.

King County has approximately 200 commercial farms and 10,000 noncommercial farms in cities as well as unincorporated areas. King County's Livestock Management Ordinance, Ordinance 11168 adopted in December 1993, requires livestock owners to manage livestock waste so that it minimizes any impacts to streams. The Livestock Management Ordinance requires the preparation of farm plans to be developed jointly by farmers and the King Conservation District (KCD) to assist in reducing water pollution from their operations. The ((conservation district)) KCD provides technical assistance and education to agricultural landowners on how to implement best management practices for federal, state and local water quality regulations. These best management practices include slurry tanks and manure lagoons, the installation of fencing to keep stock from streams and wetlands, and development of plans for livestock manure storage facilities ((in accordance with the Sensitive Areas Ordinance)).

E-((192))434 King County shall develop alternatives to improve onsite and offsite management of livestock wastes and recommend strategies to integrate processing livestock wastes with other organic waste materials. These strategies should be consistent with the King County Comprehensive Solid Waste Management Plan, including but not limited to on-farm composting and land application of processed yard debris. Alternative strategies for onsite and offsite management of livestock wastes shall be based on farm management plans, which protect water quality in streams and wetlands. Solid waste management and water quality programs should be developed to prevent liquid farm wastes from contaminating our watersheds. These programs should be integrated with actions required under the Clean Water Act and other federal and state mandates.

C. Aquatic Resources

King County's ((water)) aquatic resources include ((Puget Sound,)) rivers, streams, lakes, wetlands, groundwater, and the marine ((nearshore and receiving)) waters of Puget Sound ((, and ground water)). These resources provide many beneficial functions, including fish and wildlife habitat((,)); food supplies((,)); flood risk reduction ((and erosion control,)); water supply for agricultural, commercial, domestic and industrial use((,)); energy production((,)); transportation((,)); recreational opportunities; and scenic beauty.

In order to preserve and enhance ((the water)) aquatic resources in King County, ((these resources)) they must be managed as an integrated system((,)) together with terrestrial resources, and not as distinct and separate elements. The hydrologic cycle (the occurrence, distribution and circulation of water in the environment) is the common link among ((the water)) aquatic resources and describes their interdependence.

Our use and modification of water resources and the surrounding terrestrial environment affects how the hydrologic cycle functions and can cause unintended detrimental impacts such as flooding, low stream and river flows, reduced groundwater availability, erosion, degradation of water quality, loss of fish and wildlife habitat, and loss of archeological and traditional cultural resources that depend upon but do not damage natural resources. In order to minimize adverse impacts on the water resources of King County and ensure our continued ability to receive the benefits they provide, we need to promote responsible land and water resource planning and use.

E-((449))435 King County shall use incentives, regulations, capital projects, open space acquisitions, public education and stewardship, and other programs like reclaimed water to manage its ((water resources)) aquatic resources (Puget Sound, rivers, streams, lakes, freshwater and marine wetlands and groundwater) and to protect and enhance their multiple beneficial uses. These beneficial uses ((—)) includ((ing))e fish and wildlife habitat((,)); flood risk reduction ((and erosion control,)); water quality control ((and)); sediment transport((,)); water supply for agricultural, municipal, and industrial purposes; energy production((,)); transportation((,)); recreational opportunities and scenic beauty. Use of water resources for one purpose should, to the fullest extent practicable, preserve opportunities for other uses.

E-((420))436 Development shall support continued ecological and hydrologic functioning of water resources and should not have a significant adverse impact on water quality or water quantity, or sediment transport and should maintain base flows, natural water level fluctuations, groundwater recharge in Critical Aquifer Recharge Areas and fish and wildlife habitat.

1. Watersheds

A watershed is an area that drains to a common outlet or identifiable water body such as Puget Sound, a river, stream, lake or wetland. There are six major watersheds in King County (Cedar ((River))/Lake Washington, Green ((River))/Duwamish, Puget Sound, South Fork Skykomish ((River)), Snoqualmie ((River)) and White ((River divided into 72 individual basins)) that, in turn, contain numerous ((individual)) smaller catchments and water bodies ((with small drainages)). Surface and ground((-))waters are managed most effectively by understanding and considering potential problems and solutions for an entire watershed. Because watersheds frequently extend into several jurisdictions, effective planning and implementation must be coordinated.

E-((424))437 King County shall integrate watershed plans with marine and freshwater surface water, flood hazard management, groundwater, drinking water (and), wastewater, and reclaimed water planning, as well as federal and state Clean Water Act compliance and monitoring and assessment programs to provide efficient water resource management.

Over the past several years King County has been working cooperatively with many of the water utilities, local governments, state agencies, tribes, and other interested parties in the region to gather data and information to support a regional water supply planning process. (For more information and specific policies related to regional water supply planning, please see Chapter 8—Services, Facilities and Utilities). This cooperative work includes assessments of current and future water demands and supplies, potential climate change impacts on water, opportunities for use of reclaimed water, and potential improvements to steam flows. These cooperative efforts will provide valuable information to inform not only water supply planning but also salmon recovery planning and projects.

E-438 King County should use the information from the regional water supply planning process to enhance the county's water resource protection and planning efforts, including salmon recovery planning and projects.

E-((422))439 As watershed plans are developed and implemented, zoning, regulations and incentive programs may be developed, applied and monitored so that critical habitat in King County watersheds is capable of supporting sustainable and fishable salmonid populations. Watershed-based plans should define how the natural functions and values of watersheds critical to salmonids are protected so that the quantity and quality of water and sediment entering the streams, lakes, wetlands and rivers can support salmonid spawning, rearing, resting, and migration.

E-((425))440 Responsibility for the costs of watershed planning and project implementation, including water quality, ~~((flood hazard reduction))~~ groundwater protection, and fisheries habitat protection, should be shared between King County and other jurisdictions within a watershed.

King County contains a number of wetlands, lakes and river and stream reaches that are important to the viability of fish and wildlife populations and are therefore considered biological, social and economic resources. Some resource areas, including Regionally Significant Resource Areas and Locally Significant Resource Areas, were previously identified through basin plans and other resource inventory efforts ~~((, and are categorized as either Regionally Significant Resource Areas (RSRAs) or Locally Significant Resource Areas (LSRAs))~~. Additional high-priority habitat areas have been identified through WRIA-based salmon conservation plans, "Waterways 2000," Cedar River Legacy, and "Greenprint" acquisition plans, and through basin conditions maps used to establish protective buffers along wetlands and streams under the Critical Areas Ordinance.

~~((RSRAs))~~ These areas contribute to the resource base of the entire Puget Sound region by virtue of exceptional species and habitat diversity and abundance when compared to basins of similar size and structure elsewhere in the region. These areas may also support rare, endangered or sensitive species, including ((threatened))ESA-listed salmonids. ((LSRAs contribute to the aquatic resources within a specific basin, when compared to aquatic and terrestrial systems of similar size and structure elsewhere in the basin.)) They also provide wetland, lake, and stream habitat that is important for wildlife and salmonid diversity and abundance within the basin. ~~((As Water Resource Inventory Area plans are prepared in compliance with the Endangered Species, additional resource areas will be identified and analyzed to determine appropriate levels of resource protection.))~~

E-((426))441 King County's Shoreline Master Program, ((W))watershed management plans, Water Resource Inventory Area plans, flood hazard ((reduction)) management plans ((and)), master drainage plans, "Greenprint" open space acquisition plans, and critical areas regulations should apply a tiered system of protection that affords a higher standard of protection for more significant resources. ~~((Resource categories should include Regionally Significant Resource Areas (RSRAs), Locally Significant Resource Areas (LSRAs), Fish and Wildlife Habitat Conservation Areas, and remaining resources. Where appropriate, additional designations shall be made as additional information on environmental functions becomes available.))~~

E-((427))442 ~~((Regionally Significant Resource Areas (RSRAs) and Locally Significant Resource Areas (LSRAs) shall be mapped, designated by ordinance and protected at appropriate levels as part of early and long-term actions towards salmon conservation and recovery under the ESA. These designations shall be based on adopted basin plans or habitat/resource assessments completed for the Waterways 2000 program, but may be changed or new areas may be designated pursuant to recommendations of Water Resource Inventory Area plans. The Executive shall study the standards of protection needed for RSRAs and LSRAs.))~~ A tiered system for protection of aquatic areas should be developed based on an assessment of basin conditions using Regionally Significant Resource Area and Locally Significant Resource Area designations, WRIA Plans, habitat assessments completed for

acquisitions plans, the Water Quality Assessment, Total Maximum Daily Loads, ongoing monitoring programs, and Best Available Science.

~~((Puget Sound was included in the National Estuary Program in March 1988. The National Estuary Program requires that a comprehensive conservation and management plan for Puget Sound recommend actions to restore and protect the estuary. The 1994 Puget Sound Water Quality Management Plan is the federally approved comprehensive conservation and management plan for Puget Sound.~~

~~E-129 King County shall implement the Puget Sound Water Quality Management Plan to restore and protect the biological health and diversity of the Puget Sound Basin.~~

2. Wetlands

Wetlands are valuable natural resources in King County. They include deep ponds, shallow ~~((or deep))~~ marshes and swamps, ~~((bogs, ponds,))~~ wet meadows, and bogs. Wetlands comprise forested and scrub-shrub communities, emergent vegetation, and other lands supporting a prevalence of ~~((vegetation))~~ plants adapted to saturated soils and varying flooding regimes. ~~((Many of the larger wetlands in King County are mapped in the County's Sensitive Areas Map Folio, and their vegetation, hydrology and wildlife are briefly described in the King County Wetlands Inventory.))~~ Wetlands, with their highly diverse forms and diffuse distribution, can be particularly challenging to categorize and manage.

The federal and state governments also have roles in identifying and regulating certain types of wetlands and development activity. In order to streamline and synchronize regulatory standards for wetlands, the county refers to federal and state criteria for wetland delineation, categorization, and mitigation.

~~E-((134))443~~ As required by RCW 36.70A.175, King County shall use ((as minimum standards)) the current Washington State Wetlands Identification and Delineation Manual ((, 1997, or its successor which is)) adopted by the ((King County Council)) Washington State Department of Ecology.

~~E-444~~ King County shall categorize wetlands using the current Washington State Wetland Rating System for Western Washington ((or its successor)).

~~E-445~~ ((and is)) King County will apply the current scientifically accepted replacement methodology based on ((better)) technical criteria and field indicators jointly published in Wetland Mitigation in Washington State by Washington State Department of Ecology, US Army Corps of Engineers Seattle District and the Environmental Protection Agency Region 10 in 2006 and modified by King County.

Some wetlands are large and their physical boundaries as well as their functions and values extend beyond individual jurisdictional boundaries.

~~E-((135))446~~ King County shall ~~((work))~~ communicate and coordinate with other jurisdictions and ((federally recognized)) tribes to establish uniform countywide wetlands policies that provide protection of both regionally and locally ((unique)) highly-rated wetlands.

Wetlands are productive biological systems, providing habitat for fish and wildlife. ~~((They may serve as outdoor classrooms for scientific study. Some are used for hiking, hunting, and fishing.))~~ Wetlands also store flood waters and control runoff, thereby reducing flooding, downstream erosion and other damage. Further, wetlands protect water quality by trapping sediments and absorbing pollutants. They allow rain and snowmelt to infiltrate into aquifers, recharging them and potentially making that water available for human use. They discharge ground((-))water, making it available to plants and animals. Wetlands store peak flows and discharge to streams in dry periods, thus enabling fish and ~~((other))~~ riparian animal populations to survive. They may serve as outdoor classrooms for scientific study. Some are used for

hiking, hunting, and fishing. These wetland functions and values need consideration from a watershed perspective. Measures to protect wetland functions and values need to be taken at both the site-specific and watershed scale. In the urban growth area, land use authority is often shared by multiple jurisdictions at the scale of a drainage basin. Similarly, efforts to protect and restore wetlands may be sponsored by multiple parties, including local governments.

E-~~((436))~~447 King County’s overall goal for the protection of wetlands is no net loss of wetland functions and values within each drainage basin. Acquisition, enhancement, regulations, and incentive programs shall be used independently or in combination with one another to protect and enhance wetlands functions and values. Watershed management plans, including ~~((Water Resource Inventory Area))~~ WRIA plans, should be used to coordinate and inform priorities for acquisition, enhancement, regulations, and incentive programs within unincorporated King County to achieve the goal of no net loss of wetland functions and values within each drainage basin.

Buffers are necessary but often insufficient to adequately protect wetland values and functions especially when wetlands are small and the adjacent watershed large. Consequently, the location of development in addition to its size is important in determining its impact on wetland functions and values.

The functions and values of a wetland will change as the surrounding land ~~((use surrounding the wetland changes))~~ is altered by development and other human activities, and as local conditions are influenced by climate change. Silviculture, agriculture, and ~~((D))~~ development-related changes in forest cover and impervious surface affect stormwater runoff patterns, flooding, water quality, and wetland hydrology.

E-~~((437))~~448 Development adjacent to wetlands shall be sited such that wetland functions and values are protected, an adequate buffer around the wetlands is provided, and significant adverse impacts to wetlands are prevented.

The diversity of plants and animals found in wetlands generally far exceeds that found in terrestrial habitats in the Pacific Northwest. Habitat loss and ~~((F))~~ fragmentation ~~((of habitat is))~~ are considered the greatest threats to this native biodiversity. Wetlands in the Urban Growth Area will experience the ~~((greatest))~~ largest reduction in the distribution and number of native animals and plants due to habitat loss and fragmentation. It is anticipated that climate change will exacerbate the adverse effects of habitat loss and fragmentation by further reducing existing wetland habitat and altering wetland hydroperiods thereby increasing the inter-habitat distances and potentially restricting the dispersal and movement of plants and wildlife between favorable wetlands and habitats.

Protecting ~~((native species))~~ wetland biodiversity depends upon ~~((maintaining biological linkages,))~~ supporting the natural processes (like hydrology, nutrient cycling, and natural disturbances) that shape wetland habitat, protecting wetlands functions and values from the impacts of adjacent land uses, maintaining biological linkages, and preventing fragmentation of wetland habitats. Small wetlands strategically located between other wetlands may provide important biological links or “stepping stones” between other, higher quality wetlands. Wetlands adjacent to habitat networks also are especially critical to wildlife ~~((functions))~~ because they allow individual animals to escape danger and populations to inter-disperse and breed. ~~((and))~~ Wetlands adjacent to habitat networks should receive special consideration in planning land use.

E-~~((438))~~449 Areas of native vegetation that connect wetland ~~((systems))~~ complexes should be protected. Whenever effective, incentive programs such as buffer averaging, density credit transfers, or appropriate non-regulatory mechanisms shall be used for this purpose.

Many wildlife species require access to both wetlands and adjacent terrestrial lands to support them at different stages of their lives. For example, many amphibians breed in the water and need access to terrestrial habitat for feeding and for shelter during the winter. Fixed-width buffers alone are unlikely to

adequately address these needs or entirely protect wetlands from surrounding human activity. Adjacent and accessible terrestrial habitat may be too small or fragmented to provide core feeding, overwintering, and other habitat needs.

E-450 King County should identify upland areas of native vegetation that connect wetlands to upland habitats and that connect upland habitats to each other. The county should seek protection of these areas through acquisition, stewardship plans, incentive programs such as the Public Benefit Rating System, and the Transfer of Development Rights Program.

E-451 The unique hydrologic cycles, soil and water chemistries, and vegetation communities of bogs and fens shall be protected through the use of incentives, acquisition, best management practices, and implementation of the King County Surface Water Design Manual to control and/or treat stormwater within the wetland watershed.

E-452 Public access to wetlands for scientific, recreational use, and traditional cultural use is desirable, providing that public access trails are carefully sited, sensitive habitats and species are protected, and hydrologic continuity is maintained.

E-453 Regulatory approaches for protecting wetland functions and values, including the application of wetland buffers and the siting of off-site compensatory mitigation, should consider ~~((wetland functions and values,))~~ intensity of surrounding land uses ~~(;)~~ and basin conditions. King County should continue to review ~~((wetland research))~~ and evaluate ~~((the need for))~~ wetland research and implement changes in its wetland protection programs based on such information.

E-454 Enhancement or restoration of degraded wetlands may be allowed to maintain or improve wetland functions and values, provided that all wetland functions are evaluated in a wetland management plan, and adequate monitoring, code enforcement and evaluation is provided and assured by responsible parties. Restoration or enhancement must result in a net improvement to the functions and values of the wetland system. Technical assistance to small property owners should be considered.

E-455 Alterations to wetlands may be allowed to:

- a. Accomplish a public agency or utility development;
- b. Provide necessary crossings for utilities, stormwater tightlines and roads ~~((crossings));~~ or
- c. ~~((Avoid a denial of all))~~ Allow constitutionally mandated “reasonable use” of the property, provided all wetland functions are evaluated, the least harmful and reasonable alternatives are pursued, affected significant functions are appropriately mitigated, and mitigation sites are ~~((provided with monitoring))~~ adequately monitored.

When adverse impacts cannot be avoided, compensatory mitigation may be allowed. This means wetland creation, restoration or enhancement ~~((the))~~ to replace ~~((ment of))~~ project-induced losses of wetland functions and values ~~((will be permitted through wetland creation, restoration or enhancement))~~. The county recognizes that, especially in the Urban Growth Area, allowing alteration of ~~((small Category IV wetlands))~~ wetlands of low function in exchange for compensatory mitigation that contributes to ~~((a larger))~~ wetlands of higher functions and values within a connected wetland system ~~((and))~~ may achieve greater resource protection than simply preserving the low functioning wetland.

E-((444))456 A small Category IV wetland that is less than 2,500 square feet and that is not part of a wetland complex may be altered to move functions to another wetland on site as part of an approved mitigation plan that results in equal or greater functions.

E-((445))457 Wetland impacts should be avoided if possible, and minimized in all cases. Where impacts cannot be avoided, they should be mitigated on site if possible and if ecologically appropriate. Where on-site mitigation is not possible or appropriate, King County may approve off-site mitigation. In approving mitigation proposals, King County should consider the ecological context of the impacted wetland, as well as the wetland acreage, functions, and values. Mitigation sites should first replace or augment the functions and values that are most important to the optimum functioning of the wetland being created, restored, or enhanced. These may differ from those lost as a result of the project proposal. Wetland mitigation proposals should ~~((be approved if they would))~~ result in ~~((improved))~~ no net loss, and if possible, in an increase in, overall wetland functions and values within ~~((a))~~ the drainage basin in which the impacted site is located. ~~((All wetland functions and values should be considered. Mitigation sites should be located strategically to alleviate habitat fragmentation, and avoid impacts to and prevent loss of farmable land within Agricultural Production Districts.))~~

E-((446))458 Mitigation projects should contribute to an existing wetland system or restore an area that was historically a wetland. Mitigation sites should be strategically located to alleviate habitat fragmentation or to restore and enhance area-specific functions within a watershed. ~~((The goal for these mitigation projects is no net loss of wetland functions and values within a drainage basin.))~~

E-((447))459 Land used for wetland mitigation should be preserved in perpetuity. Monitoring and maintenance in conformance with King County standards should be provided by the project proponent until the success of the site is established.

Mitigation banks and in-lieu fee programs are ((a)) forms of regional compensatory mitigation, with the goal of providing greater resource protection and benefit to the public. ((A mitigation bank)) Both approaches can allow((s)) for the consolidation of multiple, small mitigation projects into a large-scale wetland or wetland complex, resulting in economies of scale in planning, implementation and maintenance. ((Consolidation also)) Depending on their location and functions, mitigation banks and projects constructed using in-lieu fee programs can result in wetlands of greater biological value because of their size and ecological context, and the commitment to long-term management. These mitigation approaches also provide applicants with a range of options for meeting their off-site mitigation obligations.

Mitigation banking allows compensatory mitigation to occur prior to the loss of existing wetlands and their functions and values, thereby reducing “temporal” losses. Mitigation banking allows a project proponent to generate bank credits by contributing to the creation or restoration of the bank site. In-lieu fee programs, such as King County’s Mitigation Reserves Program, allow an applicant to meet its off-site wetland mitigation requirements through payment of a fee to King County or another authorized agent with the capacity to design and construct a successful enhancement project. Both types of programs enable fees to be pooled so that larger projects can be constructed to offset many small, incremental, and cumulative impacts throughout a watershed basin. Moreover, King County’s Mitigation Reserves program enables such projects to be constructed on county-owned lands with wetlands or aquatic areas that could be restored or enhanced to benefit watershed functions. These Mitigation Reserve lands are managed for long term ecological protection, so that the landscape and stream basin context supports a successful enhancement project. Such projects can often serve to meet salmon conservation and other habitat protection objectives as well as wetland enhancement needs.

E-((448))460 The county in partnership with ~~((jurisdictions))~~ other governmental entities and interested parties should ~~((implement the))~~ encourage the development and use of

wetland mitigation bank(~~ing program~~)s through which functioning wetlands are created prior to the impacting of existing wetlands.

E-461 The county should encourage the use of Mitigation Reserves, in which wetlands are selected and pre-purchased for active management (enhancement, restoration, protection) in advance of wetland-impacting activities. The county should continue to implement its Mitigation Reserves program to provide an in-lieu fee option for applicants.

A large portion of western Washington farming occurs in lands that were once wetlands. Region-wide, agricultural lands have been targeted as mitigation sites because the relative cost of land is low and the likelihood of success in returning wetland functions is high. King County's Agricultural Production Districts—located in floodplains and the poorly drained Osceola soils of the Enumclaw Plateau—are no exception. Unless carefully sited and engineered, wetland mitigation projects can inadvertently raise water tables on adjacent agricultural properties. King County has joined other counties in discouraging the use of productive farmland for wetland mitigation, while working with farmers on wetland enhancement and restoration at a scale appropriate to sustaining a farm.

E-~~(449)~~462 Wetland mitigation projects should avoid impacts to and prevent loss of farmable land within Agricultural Production Districts. Creation of wetland mitigation banks and wetland mitigation projects under King County's Mitigation Reserves Program ~~(is)~~ are not allowed in the Agricultural Production District when the purpose is to compensate for ~~(filling)~~ wetland impacts ~~(for)~~ from development outside the APD.

3. Lakes

There are approximately 700 lakes in King County ranging in size from less than one acre to Lake Washington's roughly 21,500 acres. These lakes provide ~~(critical)~~ habitat that is essential for various life stages of ~~(for)~~ many species of fish and wildlife, including salmonids, as well as recreational opportunities and scenic beauty. Development and runoff into ~~(near)~~ lakes can alter their functioning and lead to eutrophication (increases in nutrients) ~~(Eutrophication promotes the excessive growth of plant and animal life with the eventual depletion of oxygen levels caused by decay of the excess organic matter)~~, loss of shoreline habitat, and threats to human health. Although sewage treatment has greatly reduced pollution in urban lakes like Lake Washington, runoff polluted by oil, metals, sediments, pet waste, lawn fertilizers, and pesticides can threaten human health, aquatic life, and habitat. Construction of bulkheads and docks also has the potential to impact habitat by altering shoreline vegetation and natural erosion patterns.

King County conducts water quality monitoring assessment on lakes throughout King County, in some cases supported by interlocal agreements with cities. Some of the earliest evidence of climate change includes temperature changes in our regional lakes. Changes in annual temperature cycles in King County's regional lakes, particularly Lake Sammamish, Lake Union, and Lake Washington, provide some of the most accurate measures of climate change available locally. Changes in the timing and cycling of freshwater zooplankton in Lake Washington have already been observed using King County monitoring data.

During the summer months, the county conducts regular monitoring at public swimming beaches. When monitoring indicates a public health hazard, the information is provided to Public Health -- Seattle & King County, which can issue a temporary closure order.

E-~~(433)~~463 Lakes should be protected through management of lake watersheds and shorelines. Lakes sensitive to nutrients shall be protected through the management of nutrients that stimulate algae blooms and aquatic plant growth. Where sufficient information is available, measurable standards for lake quality should be set and management plans established to meet the standards. Formation of lake management districts or

other financing mechanisms should be considered to provide the financial resources necessary to support actions for protection of sensitive lakes.

E-464 **The county, in partnership with other governments and community groups, should monitor and assess lake water and sediment quality, physical habitat, and biotic resources. Assessment should identify trends and describe impacts on human health, aquatic life, and wildlife habitat.**

E-465 **Swimming beaches on lakes should be monitored for bacterial contamination. When data shows public health to be at risk, Public Health -- Seattle & King County should take appropriate action to address public health risks.**

More information and policies on management of land uses along lake shorelines can be found in Chapter 5—Shoreline Management.

4. Groundwater Resources

Protecting ground((-))water is an important regional issue because ground((-))water provides approximately 30 percent of the water used in King County and is the primary source of water in rural areas. On Vashon Island and in other sole-source aquifer areas, it is the only source of drinking water.

The natural hydrologic system can be altered by development practices and overuse of the aquifer. The result may be depletion of aquifers. Ground((-))water is also subject to contamination from human activity. Once a source of ground((-))water is contaminated it may be lost forever. The cost of protection is considerably less than the cost of remediation and replacement. Having accurate, up-to-date information on groundwater quality and quantity is essential for managing this resource. Public education (particularly for individual well owners) and coordinated groundwater management efforts will help to protect this resource over the long-run.

E-((152))466 **King County shall identify areas in unincorporated King County that are considered Critical Aquifer Recharge Areas and maintain a map that designates these areas. The county shall update this map periodically with new information from adopted groundwater and wellhead protection studies and other relevant sources.**

E-((153))467 **King County should protect the quality and quantity of ground((-))water countywide by:**

- a. Implementing adopted Groundwater Management Plans;
- b. Reviewing and implementing approved Wellhead Protection Programs in conjunction with cities, state agencies and groundwater purveyors;
- c. Developing, with affected jurisdictions, best management practices for development and for forestry, agriculture, and mining operations based on adopted Groundwater Management Plans and Wellhead Protection Programs. The goals of these practices should be to promote aquifer recharge quality and to strive for no net reduction of recharge to groundwater quantity; ~~((and))~~
- d. Refining regulations to protect Critical Aquifer Recharge Areas and well-head protection areas;
- e. Measuring, monitoring, and reporting information on groundwater quality and quantity to provide the information needed to manage groundwater resources;
- f. Educating the public about Best Management Practices to protect groundwater;
- g. Encouraging forest retention and active forest stewardship;
- h. Incorporating into its reviews of water and sewer system plans consideration of potential impacts on groundwater quality and quantity, and the need for long-term aquifer protection; and
- i. Coordinating groundwater management efforts with cities, water districts, groundwater committees, and state and federal agencies.

E-((154))468 King County should protect groundwater recharge quantity by promoting low impact development and other methods that infiltrate runoff where site conditions permit, except where potential groundwater contamination cannot be prevented by pollution source controls and stormwater pretreatment.

E-((155))469 In making future zoning and land use decisions ((which)) that are subject to environmental review, King County shall evaluate and monitor groundwater policies, their implementation costs, and the impacts upon the quantity and quality of ground((-))water. The depletion or degradation of aquifers needed for potable water supplies should be avoided or mitigated, and the need to plan and develop feasible and equivalent replacement sources to compensate for the potential loss of water supplies should be considered.

E-((156))470 King County should protect ground((-))water in the Rural Area by:

- a. Preferring land uses that retain a high ratio of permeable to impermeable surface area and that maintain or augment the infiltration capacity of the natural soils; and
- b. Requiring standards for maximum vegetation clearing limits, impervious surface limits, and, where appropriate, infiltration of surface water. These standards should be designed to provide appropriate exceptions consistent with Policy R-231.

Climate change has the potential to impact future groundwater availability. Warmer temperatures in the Pacific Northwest are projected to lead to greater demand for water in the summer and fall, while reduced snow pack and associated stream flows could reduce seasonal groundwater recharge. Further analysis of the potential impacts of climate change on groundwater supplies is needed to understand and mitigate for potential impacts.

E-471 The county should, in partnership with water utilities, evaluate the likely effects of climate change on aquifer recharge and groundwater supplies and develop a strategy to mitigate potential impacts in coordination with other climate change initiatives.

~~((E-157 King County shall use the Vashon-Maury Island Rapid Rural Reconnaissance Report, the ongoing Vashon-Maury Island Water Resources Evaluation and other studies to direct appropriate policy and planning actions that may be necessary to protect the groundwater and surface water resources. Pending completion and implementation of the evaluation and studies, applicants for new on-site sewage disposal permits on Vashon-Maury Islands shall be required to demonstrate the following:~~

- ~~a. That the location of the on-site sewage disposal system is not within 200 feet of the documented boundaries of upper-aquifer groundwater contamination or a surface water body or stream;~~
- ~~b. That the new on-site sewage disposal system is designed to replace an existing disposal system and is likely to reduce impacts to ground and surface waters; or~~
- ~~c. That, if the size or features of a parcel make it infeasible to satisfy the 200-foot setback provided in subsection (a) above, the proposed onsite sewage disposal system uses the best available technology to reduce potential impacts to ground and surface waters. In such circumstances, the county may require periodic monitoring.))~~

5. Rivers and Streams

There are approximately 3,126 miles of rivers and streams in King County. The river and stream channels, the surrounding riparian (streamside) areas and upland areas all contribute to the functioning

and integrity of rivers and streams. Many rivers and streams provide ~~((critical))~~ habitat that is essential for various life stages of ~~((for))~~ many species of wildlife and fish, including salmonids.

Rivers and streams are dynamic systems. Winter floods can dramatically alter river and stream courses, creating new channels, eroding banks, and depositing sediment and gravel. Flooding and erosion can also dislodge trees creating log jams. These changes help to support dynamic and complex habitat for fish and wildlife. At the same time, they can create public safety issues for people living along and recreating in rivers. Public access to rivers and streams is an important consideration for water and sediment quality management. People enjoy rivers and streams for the scenic and recreation values, including boating, swimming, and fishing. Management of these systems needs to consider not only habitat protection, but also public health and safety and opportunities for education and stewardship.

In urban areas, rivers and streams in some cases also serve as stormwater drainage systems. During the winter months, runoff during storms can bring pollutants to these water bodies. During the summer months, lawn irrigation and other water uses can also carry pollutants to rivers and streams.

E-~~((132))~~472 River and stream channels, stream outlets, headwater areas, ~~((and))~~ riparian corridors, and areas where dynamic ecological processes are present should be preserved, protected and enhanced for their hydraulic, hydrologic, ecologic~~((al))~~ and aesthetic functions, including their functions in providing large wood~~((y debris sources))~~ to salmonid-bearing streams. Management of river and stream channels should consider other beneficial uses of these water bodies, including recreation.

E-473 The designation of buffers for aquatic areas, including rivers and streams, should take into account watershed-scale actions to mitigate the impacts of upland development on flooding, erosion, and habitat.

E-474 The county should encourage the use of Mitigation Reserves, in which stream and river habitat restoration projects are selected and pre-purchased for active management (enhancement, restoration, protection) in advance of development-related impacts. The county should continue to implement its Mitigation Reserves program to provide an in-lieu fee option for applicants with off-site aquatic-area mitigation requirements.

E-475 The county should continue to monitor and assess river and stream flows, water and sediment quality, physical habitats, and biotic resources in rivers and streams. Assessment should identify trends and describe impacts on human health and safety, aquatic life, and wildlife habitat.

More information and policies on management of land uses along rivers can be found in the Chapter 5—Shoreline Management. Specific policies addressing management of large wood are found in the King County Flood Hazard Management Plan.

Most streams in King County originate in either mountainous terrain or on rolling glacial uplands. These streams often descend through steep, narrow ravines before reaching the floodplain. At the point where these streams leave their ravines and flow onto the floodplain, the channel gradient (slope) and confinement decrease quickly, dramatically reducing the streams' ability to carry sediment. These are areas of natural sediment deposition and channel migration. The combination of sediment deposition and repeated channel migration creates fan-shaped deposits known as alluvial "fans."

During periods of heavy rainfall, streams often carry large sediment loads from upstream and deposit on their alluvial fans. Landslides, beaver dam failures and other natural disturbances can create episodes of particularly high rates of sediment transport. In many stream systems, instances of heavy sediment deposition may occur episodically with years or decades of apparent stability in the intervening periods.

In many instances, sediment transport and flow rates are exacerbated by upland land use conditions and associated stormwater effects.

Alluvial fans share many of the ecological attributes and land use risks associated with channel migration hazard areas and landslide hazards, though they are unique in many respects. In a natural environment, alluvial fans often provide some of the best available spawning habitat in a tributary stream, while also providing a source of gravel for areas downstream. In some heavily altered streams, the alluvial fan may represent the only remaining areas that are suitable for spawning. Alluvial fans can also form the highest ground available in the floodplain, and have historically been used for construction of buildings (including farm buildings), roads and other structures. Unfortunately, they are inherently unstable environments in which to build. During high flows coupled with sediment deposition, streams may jump their banks in the area of the alluvial fan, in some cases damaging private property, disrupting agricultural activities, destroying culverts and road crossings, stranding fish, and creating risks to public safety. Protecting buildings, roads, and crops on and along alluvial fans often requires extensive, ongoing maintenance activities. Maintenance activities can have adverse effects on habitat.

The Rural Area and Resource Lands chapter calls for alluvial fan pilot projects to test best management practices and innovative solutions for reducing hazards to agricultural landowners and protecting and/or restoring habitat.

E-476 King County should improve the management of alluvial fans through developing and clarifying definitions of alluvial fans, mapping the locations of existing alluvial fans, and developing appropriate management strategies. Strategies should protect habitat, reduce threats to public safety, and recognize current land use practices. Findings from Alluvial Fan Management Pilot Projects should inform management strategies for alluvial fans.

6. Puget Sound

~~((Puget Sound was included in the National Estuary Program in March 1988. The National Estuary Program requires that a comprehensive conservation and management plan for Puget Sound recommend actions to restore and protect the estuary. The 1994 Puget Sound Water Quality Management Plan is the federally approved comprehensive conservation and management plan for Puget Sound.~~

E-129 King County shall implement the Puget Sound Water Quality Management Plan to restore and protect the biological health and diversity of the Puget Sound Basin.))

There are approximately 110 miles of marine shoreline in King County, including 51 miles in unincorporated areas. Shorelines provide important functions for maintaining a healthy ecosystem and also provide essential habitat for a variety of important and listed species, including mammals, birds, fish, and invertebrates. The marine nearshore environment provides essential habitat for a variety of species including juvenile salmonids, forage fish, and several commercially important shellfish species. Marine resources and shoreline development are susceptible to impacts from water pollution, changes in upland vegetation, alteration of natural bluff and beach erosion patterns, and alteration of nearshore substrates and aquatic vegetation.

King County's freshwater and saltwater environments are integrally linked. Water, sediments, and nutrients move from upland areas to Puget Sound. Many species, including salmon, spend critical periods of their lives in both fresh and salt water. Salmon migrating from saltwater to their spawning areas bring nutrients back to the upland areas. Given the functional linkages between freshwater and saltwater environments, it is critical that planning and management be integrated.

A critical new venue for coordination is the Puget Sound Partnership, created by the Washington State Legislature and Governor in July, 2007. The Puget Sound Partnership was formed to achieve the recovery of the Puget Sound ecosystem by the year 2020. Multiple jurisdictions, agencies, and

community groups will be collaborating to compile existing data on Puget Sound, conduct additional assessments, and recommend actions. For example, the National Oceanic and Atmospheric Administration Fisheries is initiating work on an Integrated Ecosystem Assessment that will bring together data on both natural and socio-economic factors in relation to specific ecosystem goals for Puget Sound. It will be important to link King County's water quality data collection efforts with other assessments being conducted as part of the Puget Sound Partnership.

Additional text and policies related to the Puget Sound Partnership are found at the end of this chapter.

E-477 King County should collaborate with the federal and state agencies, cities, tribes, and universities to monitor and assess marine nearshore and waters of Puget Sound. Monitoring and assessment should address water and sediment quality, bioaccumulation of chemicals, physical habitat, and biotic resources. Assessment should identify trends and describe impacts on human health and safety, aquatic life, and wildlife habitat.

E-478 King County shall protect and should enhance surface waters, including streams, lakes, wetlands and the marine nearshore and receiving waters of Puget Sound, on a watershed basis by analyzing water quantity and quality problems and their impacts to beneficial uses, including fish and wildlife habitat, flood risk reduction, and erosion control. Conditions of and impacts to the downstream receiving marine beaches and waters of Puget Sound shall be included in watershed management efforts. (King County shall continue to participate in the Central Puget Sound Water Resource Planning effort.)

E-479 King County should protect and enhance the natural environment in those areas recommended or adopted as Aquatic Reserves by Washington State Department of Natural Resources. This should include participation in management planning for the aquatic reserves and working with willing landowners adjacent to the reserve on restoration and acquisition projects (which) that enhance the natural environment.

Human waste contains high levels of nutrients and pathogens. These pollutants can enter Puget Sound waters from a variety of sources including septic systems. A number of properties on Vashon-Maury Islands have on-site sewage systems that pre-date regulatory oversight and are undocumented. Washington State Department of Health surveys have indicated that failing systems are a significant problem in some areas of the Vashon-Maury Island shoreline. Public Health – Seattle & King County (PHSKC) is responsible for assuring that onsite sewage systems in King County meet state and local regulations. In addition, PHSKC is required to identify areas where marine water quality is threatened or impaired as a result of contamination from onsite sewage systems, to designate these areas as marine Recovery Areas (MRAs), to develop a plan to identify failed septic systems within the MRAs, and to assure that these systems are repaired and maintained. The ability to install new systems is often severely constrained in the shoreline, due to small lot size, topography, and soils. In some cases, community treatment systems are needed to effectively treat waste.

E-480 King County should work with landowners, the state Department of Health, sewer districts, and the Puget Sound Partnership to develop more effective strategies and additional resources for addressing failing septic systems in constrained shoreline environments.

More information and policies on management of land uses along Puget Sound shorelines can be found in Chapter 5—Shoreline Management.

~~(E.)~~ D. Fish and Wildlife

It is King County's goal to conserve fish and wildlife resources in the county and to maintain countywide biodiversity. This goal may be achieved through implementation of several broad policy directions that form an integrated vision for the future. Each of the pieces is necessary for the whole to be successful. The policy objectives are to (1) identify and protect ~~((critical))~~ fish and wildlife habitat conservation areas, (2) link those ~~((critical))~~ habitat areas and other important conservation areas, and ~~((other))~~ protected lands through a network system, ~~((and))~~ (3) integrate fish and wildlife habitat and conservation goals into new and existing developments, and (4) initiate a transition from single species management approaches to multi-species, biodiversity management approaches. Conservation of biodiversity is necessary if wildlife benefits currently enjoyed by residents of the county are to be enjoyed by future generations.

Federal and state laws have been enacted over the past century to protect a wide range of species. In addition to the Endangered Species Act, other federal laws include the Marine Mammal Protection Act, and the Migratory Bird Treaty Act. Marine mammals and migratory birds in King County are protected under the provisions of these laws. Additionally, King County maintains policies regarding specific species.

King County's current fish and wildlife policies and regulations have been shaped by federal and state fish and wildlife protections, which include requirements for protection of specific species and habitats. However, both the federal and state governments have recognized the need for a comprehensive approach to addressing biodiversity conservation. In December 2007 the Washington Biodiversity Council released the Washington Biodiversity Conservation Strategy. The three primary goals set forth in the strategy are to protect quality of life for people, conserve species diversity, and restore and care for ecosystems. The three core initiatives set forth by the strategy propose (1) a landscape approach to guide investments and actions, (2) incentives and markets for landowners, and (3) citizens working together with scientists to inventory and monitor the state's biodiversity. WDFW is also working to integrate landscape-level approaches to promoting the conservation and sustainability of biodiversity, and is in the process of updating its Priority Habitats and Species recommendations to reflect a more integrated, landscape approach. In order to integrate a more landscape-level approach to fish and wildlife protection at the county level, the county will need a methodical approach to mapping the county's biodiversity and identifying areas that support rare species and the greatest diversity of native wildlife. The current policy amendments are intended to fulfill federal and state requirements for protection of specific species and habitats while making a transition to more landscape-based approaches to fish and wildlife conservation.

1. General Policies

~~E-((469))481~~ The county shall strive to ~~((maintain))~~ conserve the ~~((existing))~~ native diversity of species and habitats in the county.

E-482 In the Urban Growth Area, King County should strive to maintain a quality environment ~~((which))~~ that includes fish and wildlife habitats that support the greatest diversity of native species consistent with GMA-mandated population density objectives. ~~((The county should maximize wildlife diversity in the Rural Area.))~~ In areas outside the Urban Growth Area, the county should strive to maintain and recover native landscapes, ecosystems, and habitats that can support viable populations of native species. This should be accomplished through coordinated conservation planning and collaborative implementation.

~~E-((170))483~~ ~~((Fish and wildlife should be maintained through conservation and enhancement of~~ ~~terrestrial~~ ~~((air,))~~ and aquatic habitats should be conserved and enhanced to protect and improve conditions for fish and wildlife.

2. Fish and Wildlife Habitat Conservation Areas

The Growth Management Act requires jurisdictions to designate Fish and Wildlife Habitat Conservation Areas for protection. The Washington Administrative Code (WAC 365-190-080) sets out guidelines that jurisdictions must consider when designating these areas.

~~((As set forth in the WAC guidelines, Fish and Wildlife Habitat Conservation Areas include:~~

- ~~a. Areas with which endangered, threatened, and sensitive species have a primary association;~~
- ~~b. Habitats and species of local importance;~~
- ~~c. Commercial and recreational shellfish areas;~~
- ~~d. Kelp and eel grass beds; herring and smelt spawning areas;~~
- ~~e. Naturally occurring ponds under 20 acres and their submerged aquatic beds that provide fish or wildlife habitat;~~
- ~~f. Waters of the state;~~
- ~~g. Lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity; or~~
- ~~h. State natural area preserves and natural resource conservation areas.~~

~~It is important to note that for some species mere presence is not considered significant. Significant habitats, for some species, are those areas that may be limited during some time of the year or stage of the species life cycle.))~~

King County has reviewed these guidelines and has developed policies E-~~((172))484~~ through E-~~((176))499b~~, ~~((that))~~ which address the various species included in the ~~((WAC))~~ Washington Administrative Code (WAC) guidelines. These policies recognize the tiered listing of these species and their habitats as defined by the United States Fish and Wildlife Service, National Marine Fisheries Service, and the Washington State Department of Fish and Wildlife (i.e., endangered, threatened, sensitive, and candidate). These policies also recognize the need to regularly review the information developed on species and habitats and amend the tiered listing as appropriate. The WAC guidelines also suggest that aquatic areas and wetlands be considered when designating fish and wildlife habitat conservation areas. Aquatic areas and wetlands and their associated buffers are highly valuable wildlife habitat, and protections for these areas are addressed in other provisions of this chapter.

E-~~((172))484~~ King County shall designate and protect, through measures such as regulations, incentives, capital projects or purchase, the following Fish and Wildlife Habitat Conservation Areas found in King County:

- a. Habitat for federal or state listed Endangered, Threatened or Sensitive species;**
- b. Habitats of Local Importance and Habitats for ~~((Salmonids))~~ Species of Local Importance~~((: kokanee/sockeye/red salmon, chum salmon, coho/silver salmon, pink salmon, coastal resident/searun cutthroat, rainbow trout/steelhead, bull trout, Dolly Varden, and pygmy whitefish, including juvenile feeding and migration corridors in marine waters;~~**
- c. Habitat for Raptors and Herons of Local Importance: ~~osprey, black-crowned night heron, and great blue heron))~~;**
- ~~((d))~~**c. Commercial and recreational shellfish areas;**
- ~~((e))~~**d. Kelp and eelgrass beds;**
- ~~((f))~~**e. Herring~~((, sand lance))~~ and smelt spawning areas;**
- ~~((g))~~**f. Wildlife habitat networks designated by the county, and**
- ~~((h))~~**g. Riparian corridors.**

~~((King County shall also protect the habitat for the red-tailed hawk and for candidate species, as listed by the Washington Department of Fish and Wildlife, found in King County outside of the Urban Growth Area.))~~

Protections for other Fish and Wildlife Habitat Conservation Areas, including waters of the state and lakes, are addressed in other sections of this chapter and in Chapter 5—Shoreline Management.

3. Federal and State Listed and Candidate Species

E-~~(174)~~485 ~~Habitats for species ((which)) that have been identified as endangered, threatened, or sensitive by the state or federal government shall not be reduced and should be ((preserved)) conserved. ((In the Rural Area and Natural Resource Lands, habitats for candidate species identified by the county, as well as species identified as endangered, threatened, or sensitive by the state or federal government shall not be reduced and should be preserved.))~~

Federal and state listings of species as Endangered or Threatened generally encompass relatively large geographic areas. More localized declines of species within King County may not be captured by state and federal listings. For example, local monitoring data indicates significant declines in the Middle and Late Lake Sammamish Kokanee salmon runs, and the extinction of the Early Lake Sammamish Kokanee run. However, this species has not been listed by the state or federal government as threatened or endangered.

The federal and state governments also designate “candidate” species. In the context of the ESA, candidate means any species being considered for listing as an endangered or a threatened species but not yet the subject of a proposed rule. Lists of federal candidate species are updated annually. Review of these lists and the supporting assessments can provide valuable information about threats to species found within King County and can help the county to be proactive in preparing for potential future listings.

E-486 King County should review fish and wildlife surveys and assessments with local application to King County and consider additional habitat protections where warranted. Habitat protection should be accomplished through incentives, cooperative planning, education, habitat acquisition, habitat restoration, or other appropriate actions based on best available science.

E-487 King County should review federal and state candidate listings for information about candidate species found in King County. King County shall protect habitat for candidate species, as listed by the Washington Department of Fish and Wildlife or a federal agency. Information regarding candidate species should be used to inform King County’s long-term wildlife conservation and planning efforts.

4. Species and Habitats of Local Importance

The state defines species of local importance as those species that are of local concern due to their population status or their sensitivity to habitat manipulation or that are game species. King County refines the definition to include native species listed as priority species by the Washington State Department of Fish and Wildlife, bird species whose populations in King County are known to have declined significantly over the past 150 years, anadromous salmonids, and aquatic species whose populations are particularly vulnerable to changes in water quality and quantity. King County policy-makers have also provided additional local protection to specific species, including red-tailed hawk, in response to concerns of community groups and schools.

E-~~(173)~~488 ~~King County should protect the following native species of local importance(~~, as listed by the Washington Department of Fish and Wildlife or listed by King County, on lands outside of the Urban Growth Area, where they are likely to be most successful~~), or their habitats, as appropriate. Protection should be accomplished through regulations, incentives or habitat purchase.~~

Species of local importance are:

- a. ~~Salmonids – kokanee(~~/sockeye/red~~)~~ salmon, sockeye/red salmon, chum salmon, coho/silver salmon, pink salmon, coastal resident/searun cutthroat,

- rainbow trout(~~(steelhead, bull trout)~~), Dolly Varden, and pygmy whitefish, including juvenile feeding and migration corridors in marine waters
~~((Habitat for Raptors and Herons of Local Importance – osprey, black-crowned night heron, and great blue heron;))~~
- ~~((a))~~**b.** ~~((Mollusks–))~~ Native Freshwater Mussels – Western pearlshell mussel, Oregon floater, and western ridge mussel~~((, Geoduck clam and Pacific oyster))~~;
- ~~((b))~~**c.** ~~((Crustaceans))~~ Shellfish – Red Urchin, Dungeness crab~~((and))~~, Pandalid shrimp, Geoduck clam, and Pacific oyster;
- ~~((c. Echinoderms – Red urchin;))~~
- d.** Marine Fish – White sturgeon, Green Sturgeon, Pacific herring,~~((channel catfish,))~~ longfin smelt, surfsmelt, ~~((Pacific cod, Pacific whiting, black rockfish, copper rockfish, quillback rockfish, yelloweye rockfish,))~~ lingcod, Pacific sand lance, English sole, and rock sole;
- e.** Birds – Western grebe, American bittern, great blue heron, ~~((Trumpeter swan, Tundra swan, Snow goose, Band-tailed pigeon,))~~ Brant, Harlequin duck, Wood duck, Hooded merganser, Barrow’s Goldeneye, Common Goldeneye, Cinnamon teal, Blue-winged teal, Surf scoter, White-winged scoter, Black scoter, osprey, Red-tailed hawk, ((Blue)) Sooty grouse, Ruffed grouse, Band-tailed pigeon, Belted kingfisher, Hairy Woodpecker, American three-toed woodpecker, Olive-sided Flycatcher, Mountain chickadee, Western Meadowlark, Cassin’s Finch, and Purple Finch ~~((Mountain quail, and Western bluebird,))~~; ~~((and))~~
- f.** Mammals – Marten, mink, Columbian black-tailed deer, elk, ~~((and))~~ mountain goat, Douglas Squirrel, and Townsend Chipmunk~~((,))~~;
- g.** Amphibians – Red-legged frog; and
- h.** Reptiles – Alligator lizard and western fence lizard.

It should be noted that under the Migratory Bird Treaty Act, with few exceptions, no migratory bird or its nest may be harmed.

Wildlife habitats such as caves, cliffs, and talus occupy a very small percent of the total land area, yet they are disproportionately important as wildlife habitats. Each of these habitats concentrates and supports a unique animal community, and adjacent plant associations provide food sources, help stabilize light and wind patterns, and provide perches for raptors. Caves, cliffs, and talus are fragile environments that can be easily destroyed, but not restored. Additionally, some of these special wildlife habitats have unique or significant value to a diverse assemblage of species, not just one particular species.

E-~~((174))~~489 King County should protect the following priority habitats listed by the Washington Department of Fish and Wildlife that are not otherwise protected by policies and codes. Protection should be accomplished through regulations, incentives or purchase. ~~((Priority habitats are))~~ These areas include: caves, cliffs, consolidated marine/estuarine shorelines, estuary, old growth/mature forest, unconsolidated marine/estuarine shorelines, snag-rich areas, and talus slopes.

Protections of other priority habitats, including riparian habitat, instream habitat, and freshwater wetlands can be found in other policies in this chapter.

E-~~((176))~~490 King County should regularly review the Washington State Department of Fish and Wildlife’s list of Priority Species and other scientific information on species of local importance, and evaluate whether any species should be added to or deleted from the lists in Policies E-~~((173))~~488 and E-~~((174))~~489. Any additions or deletions should be made through the annual amendment process for the comprehensive plan.

E-~~((175))~~491 Development proposals should be assessed for the presence of species of local importance. A comprehensive assessment should follow a standard procedure or guidelines and shall occur one time during the development review process.

Salmon are particularly important because of their significance to local and regional character, ~~((federally recognized))~~ tribes, salt and freshwater ecosystems, and ~~((the))~~ recreational and commercial fisheries ~~((industry))~~. ~~((Several))~~ A growing number of salmon stocks within King County and other areas of Puget Sound are in a serious state of decline. ~~((Several))~~ Three salmonid ~~((stocks))~~ species present within King County have been ~~((or are about to be))~~ listed under the ~~((Endangered Species Act))~~ ESA, several others have significant potential for listing, and the salmon-dependent Orca whale has been listed as Endangered.

The ~~((most effective way to protect and enhance native fish populations is through))~~ protection and restoration of ~~((these))~~ river and stream channels, riparian corridors, lakes, wetlands, headwaters and watersheds that provide or impact spawning and rearing habitat, food resources and fish passage is essential to the conservation of native fish populations. Intermittent streams also can be critical to native fish populations.

Hatcheries and other artificial propagation facilities that are properly managed to protect the abundance, productivity, genetic diversity, and spatial distribution of native salmon ~~((remain critical))~~ may contribute in the near term to both maintaining sustainable salmon stocks and harvest opportunities while habitat protection and restoration measures for salmon are implemented.

E-~~((478))~~492 King County should protect salmonid habitats by ensuring that land use and facility plans (development, transportation, water, sewer, electricity, gas) include riparian and stream habitat conservation measures developed by the county, cities, ~~((federally recognized-))~~ tribes, service providers, and state and federal agencies. Project review of development proposals within basins that contain hatcheries and other artificial propagation facilities that are managed to protect the abundance, productivity, genetic diversity, and spatial distribution of native salmon and provide harvest opportunities should consider significant adverse impacts to those facilities.

5. Landscape Approaches to Fish and Wildlife Habitat Conservation

Fish and wildlife habitat conservation means land management for maintaining species in suitable habitats within their natural geographic distribution so that isolated subpopulations are not created. Fish and Wildlife Habitat Conservation Areas are intended to ensure the conservation of individual species recognized as declining or imperiled; however, this approach of protecting individual animals is only one aspect of protecting the county's biodiversity. Because biodiversity encompasses a variety of levels, from genes to ecosystems, and occurs at multiple spatial scales, a wider approach beyond single-species management is necessary to conserve biodiversity in King County. Additionally, most fish and wildlife species are not confined to small portions of the landscape; rather, they move about for feeding, breeding, rearing young, and interacting with other members of their species to insure adequate genetic exchange and population viability.

E-493 King County should collaborate with other governments, private and non-profit organizations to establish a bioinventory, an assessment and monitoring program, and a database of species currently using King County to provide baseline and continuing information on wildlife population trends in the county.

E-494 Distribution, spatial structure, and diversity of native wildlife and plant populations should be taken into account when planning restoration activities, acquiring land, and designing and managing parks.

~~((Existing buffer requirements))~~ Standard buffers for streams and wetlands ~~((are not intended to, and do not,))~~ will not always adequately protect wildlife resources ~~((in))~~ that utilize those sensitive areas. Areas with critical wildlife resources may need larger buffers to protect the resource.

E-((477))495 Stream and wetland buffer requirements may be increased to protect species of local importance, as listed in this chapter, and their habitats, as appropriate. Whenever possible, density transfers and/or buffer averaging should be allowed.

Protection of isolated blocks of habitat will not always adequately protect wildlife in King County. Critical wildlife habitats and refuges also need to be connected across the landscape through a system of habitat corridors, or networks. Some areas may be important more because they connect other important areas together rather than because of any particular species present.

Network width is related to requirements of desired wildlife species, length of network segment and other ~~((desired))~~ important ~~((uses))~~ characteristics within the network. Wider corridors will be required for larger species if the distance between refuges is great or if multiple uses, such as public access and trails, are desired. ~~((Since))~~ Because it may not be possible to protect wide corridors in the Urban Growth Area, it may not be possible to accommodate larger wildlife species in all areas. Networks will address some of the problems of habitat fragmentation for smaller species within the Urban Growth Area.

Potential linkages are identified on the Wildlife Network and Public Ownership Map. Open spaces set aside during subdivision of land should be located to make connections with larger offsite systems. This approach will also benefit other open space goals.

E-((479))496 Dedicated open spaces and designated ~~((sensitive))~~ critical areas help provide wildlife habitat. Habitat networks for threatened, endangered and priority species of local importance, as listed in this chapter, shall be designated and mapped. Habitat networks for other priority species in the Rural Area should be designated and mapped. ~~((Planning should be coordinated to ensure that connections are made with adjacent segments of the network.))~~ These mapping efforts should proceed from a landscape perspective using eco-regional information about the county and its resources, and should be coordinated with state and federal ecosystem mapping efforts as appropriate.

~~((King County shall also protect the habitat for candidate species, as listed by the Washington Department of Fish and Wildlife, found in King County outside of the Urban Growth Area.))~~

E-((480))497 King County should work with adjacent jurisdictions, state and federal governments ~~((and)),~~ ~~((federally recognized-))~~ tribes, and landowners during development of land use plans, ~~((Water Resource Inventory Area))~~ WRIA plans, and site development reviews to identify and protect habitat networks at jurisdictional and property boundaries.

A key element in ~~((a comprehensive))~~ local wildlife ~~((protection program))~~ conservation is the integration of wildlife and habitats into developments of all types. Wildlife ~~((P))~~protection ~~((of many types of wildlife))~~ does not have to be at odds with many types of development. Urban multifamily projects, industrial developments, new school facilities and rural open space projects all provide opportunities to enhance wildlife amenities. Residential developers and businesses have been able to use wildlife in marketing strategies to attract more potential homeowners, renters and quality employees.

Techniques such as minimizing clearing during site preparation, using native plant species in required buffers, landscaping, using bridges rather than culverts to cross streams and innovative site design can be used to promote wildlife and minimize problems with nuisance wildlife. Other plan elements, such as open space, road system design and housing density, also have related impacts on the remaining wildlife values that must be considered.

Benefits to wildlife are enhanced if screening and landscaping is composed of native vegetation. Retention of natural vegetation can provide the same wildlife and aesthetic benefits at a lower cost.

E-((184))498 New development should, where possible, incorporate native plant communities into the site plan, through both through preservation of existing native plants ((into the site plan,)) and addition of new native plants.

E-((182))499 The county should be a good steward of public lands and should integrate fish and wildlife habitat((s)) considerations into capital improvement projects whenever feasible. Fish and Wildlife Habitat Conservation Areas should be protected and, where possible, enhanced as part of capital improvement projects.

7. Fish and Wildlife Habitat Conservation Incentives and Education

King County offers landowner technical assistance for protection of fish and wildlife habitat through programs like the Rural Stewardship Planning, Forest Stewardship and Naturescaping Classes, and the Salmon Watcher Program. Other organizations offer complementary classes such as the King Conservation District's land and water conservation workshops for agricultural landowners. Landowners can also receive property tax reductions through the Public Benefit Rating System in exchange for protecting and improving habitat. Some property owners, particularly new rural land owners, may not be aware of these programs.

E-((183))499a The county should promote voluntary wildlife habitat enhancement projects by private individuals and businesses through educational, active stewardship, and incentive programs.

E-499b King County should partner with community associations, realtors, community groups, and other agencies to conduct targeted outreach to potential and new property owners about fish and wildlife habitat education and forestry education and incentive programs, particularly in rural and resource lands areas of the county.

E. Flood Hazard Management

Floodplains are lands adjacent to lakes, rivers and streams that are subject to periodic flooding. Floodplains naturally store flood water, contribute to groundwater recharge, protect water quality and are valuable for recreation, agriculture and fish and wildlife habitat. Floodplains also provide a deposition zone for sediments mobilized by rivers and streams. Wetlands are often an integral part of floodplains. Floodplains are designated based on the predicted frequency of flooding for a particular area. For example, a 100-year floodplain is a land area that has a one percent probability of experiencing flooding in any given year.

Development can reduce the floodplain's ability to store and convey floodwaters, thereby increasing the velocity and depth of floodwaters in other areas. In addition, floodplain development often occurs at the expense of important fish and wildlife habitat. King County has adopted the Flood Hazard ((Reduction)) Management Plan to provide guidance for decisions related to land use and ((flood control)) floodplain management activities.

E-((154))499c King County's floodplain land use and floodplain management activities shall be carried out in accordance with the King County Flood Hazard ((Reduction)) Management Plan.

The primary focus of King County's Flood Hazard Management efforts is protecting public health and safety. However, in many cases, flood hazard management projects can be designed in a manner that enhances or restores flood storage, conveyance, and ecological values of the floodplain and associated wetlands and riparian corridors. Requirements for state and federal permits necessary for construction of capital projects typically require that projects be designed to protect and enhance habitat.

E-((150))499d The existing flood storage and conveyance functions and ecological values of floodplains, wetlands, and riparian corridors shall be protected, and should, where possible, be enhanced or restored.

F. Hazardous Waste

Throughout King County, businesses use and generate hazardous materials as part of their normal operations. There are numerous rules and requirements for the proper management of these materials and requirements can vary slightly by jurisdiction. Often the businesses will learn of these requirements after they have found out that they are not in compliance. To help mitigate the potential harmful effects to human health and the environment and to minimize the economic impacts to businesses that may generate hazardous chemicals, King County provides education and technical assistance to businesses on requirements for proper management and disposal of hazardous chemicals, as well as information on less toxic alternatives.

Contacting businesses with information on proper hazardous waste disposal as early as possible in the business development phase can help to prevent improper disposal of hazardous waste and associated risks to public safety and the environment. Taking a preventative approach can also help to avoid costly code violations.

E-499e **King County should review new business permit and change of use applications for businesses that propose to use hazardous chemicals or generate hazardous waste as part of their operations. The county should offer to provide technical assistance related to hazardous waste disposal requirements and non-toxic alternatives.**

~~((D. Erosion and Landslide Hazards))~~

V. GEOLOGICALLY HAZARDOUS AREAS

King County is located on the active, tectonic Pacific "Ring of Fire," which is characterized by numerous, dynamic geologic processes that include frequent earthquakes and recurring volcanic eruptions. The relatively recent glacial history has left numerous steep and unstable hillsides throughout the county. Because of these steep and unstable hillsides, many areas of the county are prone to naturally occurring landslides and tree falls. Snow avalanches are also a common occurrence in the Cascade Mountains in Eastern King County. Often times the result of these naturally occurring events can be beneficial to the environment, by providing gravel and woody debris in streams and rivers, and continuing the process of natural regeneration. Salmon need gravel for spawning and in-stream debris for cover and to provide shade and regulate temperature. King County must balance the positive benefits of these natural occurrences with any adverse impacts that pose a threat to public health and safety. The county must also strike a balance between allowing naturally occurring landslides and erosion, and the need to prevent the unnatural acceleration of landslides and erosion due to development activities.

Coal mines have created additional areas of subsidence and instability in addition to those which occur naturally. When human activity occurs in areas subject to such active geologic processes, the potential consequences to life, property and environmental integrity can be enormous. If geologic processes are recognized and appropriately addressed in the course of development activities, adverse consequences can be substantially reduced if not completely eliminated. ~~((King County maintains inventories and maps of geologic hazards in the King County Sensitive Areas Map Folio.))~~

~~((1))~~A. Erosion Hazard Areas

Virtually any area in King County can experience soil erosion if subjected to inappropriate grading and construction practices. The U.S. Department of Agriculture Soil Conservation Service has identified certain soil types in King County as being especially subject to erosion, if disturbed. ~~((The approximate extent of these areas is shown in the King County Sensitive Areas Map Folio.))~~ These Erosion Hazard Areas may not be well suited to high-density developments and intensive land uses because of the sensitivity of these soils to disturbance.

~~E-((458))~~501 Grading and construction activities shall implement erosion control best management practices and other development controls as necessary to reduce sediment and pollution discharge from construction sites to minimal levels.

~~E-((459))~~502 Land uses permitted in Erosion Hazard Areas shall minimize soil disturbance and should maximize retention and replacement of native vegetative cover.

~~E-((460))~~503 Slopes with a grade of 40 percent or more shall not be developed unless the risks and adverse impacts associated with such development can be reduced to a nonsignificant level. No-disturbance zones shall be designated where basin plans identify the need to prevent erosion damages in areas that are extremely sensitive to erosion impacts. Properly designed stormwater tightlines may be allowed within designated no-disturbance zones.

Vegetation is an important component of the natural environment. This general term refers to all plant life growing at, below or above the soil surface. It includes trees, shrubs, herbs, grasses and aquatic plants.

Vegetation, especially forests, provides many significant ecological functions. Vegetation absorbs, filters and slows surface water flow. This is particularly important over aquifer recharge areas. Native vegetation also provides wildlife habitat to which native species are well adapted. Forests are key

components in atmospheric cycles; they absorb carbon dioxide, produce oxygen and filter particulate matter. Additionally, they absorb noise and are aesthetically pleasing.

Noxious weeds are nonnative invasive plants that pose a threat to health and safety, agriculture, wildlife, wetlands and recreational areas. They tend to spread in areas that have been disturbed by urban development and agriculture and are difficult to eradicate once they become established. Without natural predators, some noxious weeds can displace native plant communities, reducing plant diversity. Invasive plants also decrease the quality of wildlife habitats, reduce visual quality, and increase maintenance and production costs for natural resource managers and farmers.

E-((464))504 King County should protect native plant communities by encouraging management and control of nonnative invasive plants, including aquatic plants. Environmentally sound methods of vegetation control should be used to control noxious weeds.

E-((462))505 Through training and other programs, King County should actively encourage the use of environmentally safe methods of vegetation control. Herbicide use should be minimized. King County should be a good steward of public lands and protect water quality, by reducing the use of insecticides, herbicides and fungicides through the use of integrated pest and vegetation management practices.

E-((463))506 The use of native plants should be encouraged in landscaping requirements and erosion control projects, and in the restoration of stream banks, lakes, shorelines, and wetlands.

E-((464))507 In response to watershed-based salmon conservation Water Resource Inventory Area plans and as part of King County's continued basin planning and stewardship programs, King County may adopt vegetation retention goals for specific drainage basins. These goals should be consistent with Policy R-23((2))6, as applicable. The county should adopt incentives and regulations to attain these goals, and the county should monitor their effectiveness.

((2))B. Landslide and Avalanche Hazard Areas

Certain hillsides in King County are either naturally unstable or susceptible to instability when disturbed. These hillsides contain slopes greater than 15 percent, are underlain by impermeable soils, and are subject to seepage. They also include areas that have experienced landslides in the past and have slopes that are being undermined by stream or beach erosion. Construction in these areas is expensive and difficult. Landslides on such slopes following development can result in enormous public and private costs and severe threats to human health and safety. Such landslides can also cause severe natural resource damage.

Many of the mountainsides in the Cascade Range in Eastern King County are subject to snow avalanches during the winter. Such avalanches are destructive and can be deadly. King County supports all efforts to monitor and share information regarding avalanche dangers and to alert the public of those dangers.

E-((465))508 Avalanche or Landslide Hazard Areas should not be developed unless the risks and adverse impacts associated with such development can be reduced to a nonsignificant level. Development proposed in or adjacent to avalanche or landslide hazard areas shall be adequately reviewed and mitigated to ensure development does not increase landslide or erosion hazards that would adversely impact downstream properties or natural resources.

((3))C. Seismic Hazard Areas

King County is an earthquake-prone region subject to ground shaking, seismically induced landslide and liquefaction of soil. Areas with low-density soils are likely to experience greater damage from earthquakes. ~~((Areas in King County with a high potential for seismic induced subsidence, landslide, and other damages are shown in the King County Sensitive Areas Map Folio under seismic and landslide hazard areas.))~~

E-((467))509 In areas with severe seismic hazards, special building design and construction measures should be used to minimize the risk of structural damage, fire and injury to occupants and to prevent post-seismic collapse.

((4))D. Volcanic Hazard Areas

King County is located in a region characterized by active volcanism. The volcanic hazard that poses the greatest risk to safety and well being of county residents would be from a lahar (volcanic mudflow) originating on Mt. Rainier and flowing down the White River valley (possibly overflowing into the lower Green River Valley). Ongoing investigations by the United States Geological Survey continue to clarify the nature of this hazard. Current information provides the basis for taking steps to mitigate that risk.

E-((468))510 King County should ~~((support efforts to model the effects of a mudflow comparable to the prehistoric mudflow which occurred in the White River drainage basin.))~~ work with the United States Geological Survey to identify lahar hazard areas and shall work with local governments to assess the risk to county residents from lahars and to implement appropriate emergency planning and implement appropriate development standards.

((3))E. Coal Mine Hazard Areas

King County has a long and varied history of underground and surface coal mining. Some coal mining was conducted by large, well-capitalized mining companies ~~((which))~~ that used methods such as detailed underground and surface mapping and protection of surface improvements. Other mines were small operations or remaining operations that sought to maximize coal extraction with less regard for surface impacts or mapping. Some intensively developed areas of King County are located over abandoned underground coal workings, including Talbot Hill and the north Benson Hill of Renton, the Spring Glen area around Cascade Vista, East Fairwood, Black Diamond, southwest Issaquah, and the Newcastle/Coal Creek area.

The greatest dangers to people, wildlife and surface facilities typically exist around mine portals, timber chutes, air shafts, and workings which have collapsed to the surface. Other areas were deep mined by "room and pillar" mining techniques in which "pillars" of coal were left to provide support for the mining of adjacent "rooms." Once abandoned, pillars would collapse and rooms of mined-out coal would fill with collapsed roof material, coal debris and water. Regional downwarping of these areas was generally not observable and usually happened in the early years following mining of a section. Deep mined areas with a high ratio of overburden/cover-to-void usually present no hazards for surface development. However, areas with low overburden/cover-to-void ratio present higher risks and may require more advanced investigations and construction techniques for development. Mine portals, timber chutes, airshafts, and workings which have collapsed to the surface require the greatest need for detailed engineering studies to ensure that these sites are safe for new, productive use.

E-((466))511 King County encourages the elimination of coal mine hazard areas and will work with public and private property owners and the Office of Surface Mining, Reclamation, and Enforcement to eliminate hazards and return lands to their highest productive uses. Land use plans and development activities should reflect the potential hazards in these areas. Residential, commercial, and industrial

development may occur in coal mine hazard areas following study and engineering reports which detail the extent of the hazards, if any, and mitigation. Significant hazards associated with abandoned coal mining workings should be eliminated or mitigated so the site is safe using appropriate criteria to evaluate the proposed subsequent use. King County recognizes that most areas underlain by deep underground mining may be suitable for new development. Landowners and their consultants may be required to provide studies and reports with recommendations from licensed, professional engineers. Proposed surface facilities over some hazard areas may need to incorporate special design and performance tolerances for structures and infrastructure improvements. The location and declassification of coal mine hazard features should be shown on recorded plat maps or site plans of the property. When new information regarding the location of coal mine hazard areas is discovered, it should be added to or deleted from existing maps and databases that record coal mine hazard area information.

~~II. Endangered Species Act~~

VI. Cooperative Salmon Recovery and Puget Sound Partnership

~~((In March 1999, The National Marine Fisheries Service (NMFS) listed the chinook salmon as "threatened" under the Endangered Species Act (ESA). In December 1999, the U.S. Fish and Wildlife Service (USFWS) listed the Puget Sound and Coastal Bull trout as threatened under the ESA. It is anticipated that listing of other salmonid species may follow in the near future.))~~

~~The protection and recovery of salmonid species that are listed under the ESA is and will continue to be a significant issue for King County. The listing of a species under the act is cause for great concern, because Wild Pacific salmon have great environmental, cultural, economic, recreational and symbolic importance to the Puget Sound region. ((It is King County's goal to ensure long-term protection of our salmon resources to harvestable levels for today and tomorrow, with the least economic impact possible. Successful restoration and maintenance of healthy salmon populations will require time, money and effort, and collaboration with federal, state, tribal and local governments, as well as businesses, environmental groups, and citizens.))~~

~~It is King County's goal to ensure the recovery and maintenance of our salmon populations to sustainable and harvestable levels, and to accrue the ecological, cultural and economic benefits that will be provided by healthy salmon stocks, King County will pursue salmon conservation strategies that sustain the region's vibrant economy. Successful restoration and maintenance of healthy salmon populations will require time, money and effort, and collaboration with federal, state, tribal and local governments, as well as businesses, environmental groups, and citizens.~~

~~The increasing number and diversity of ESA federally protected species in King County and around the Puget Sound calls for the development and implementation of species conservation actions that are embedded within a strategy that addresses natural resource management issues at the ecosystem scale. Although species are listed one at a time, managing them toward recovery and robust health that way increases the likelihood that conservation efforts will be incomplete, redundant, and more expensive.~~

A. Watershed-Based Salmon Recovery

~~As a means to address salmonid listings and to sustain this precious resource for generations to come, ((L))local governments in the Puget Sound region, in cooperation with state and tribal governments and other major stakeholders, ((established the Tri-County salmon conservation coalition to identify early actions and develop long-term conservation strategies. The early actions focus on protecting salmon habitat in order to preserve options for recovery. The)) have developed long-term salmon habitat conservation strateg((y))ies ((is being developed)) at the Watershed Resource Inventory Area (WRIA) level. The boundaries of WRIAs are defined under state regulations, and generally adhere to the watershed boundaries of major river or lake systems. King County ((is participating)) participated as an affected jurisdiction in the development ((Water Resource Inventory Area)) WRIA plans for WRIA 8 (Cedar/Sammamish Watershed), WRIA 9 (the Green/Duwamish Watershed), WRIA 7 (the Snohomish/Snoqualmie Watershed), about half of which is in King County, and WRIA 10 (the White/Puyallup Watershed), a small percentage of which is in King County. Additionally, King County has acted as a service provider at the direction of multi-jursidictional forums for the development and implementation of the salmon recovery plans for WRIAs 8 and 9, and for the King County portion of WRIA 7.~~

~~E-((204))601 King County shall continue to participate in the Water Resource Inventory Area((planning))-based salmonid recovery plan implementation efforts and in other regional ((planning)) efforts to recover salmon and the ecosystems they depend on,~~

such as the ~~((Tri-County salmon conservation coalition and Shared Strategy for Puget Sound, to develop plans for each of the watersheds in King County))~~ Puget Sounds Partnership. ((T))King County's participation in ((these)) plan((s))ing and implementation efforts shall be guided by the following principles:

- a. Focus on early federally listed salmonid species first, take an ecosystem approach to habitat management and seek to address management needs for other species over time;
- b. ~~((Identify))~~ Concurrently work on early actions ~~((and))~~, long-term projects and programs that will lead to improvements to, and information on, habitat conditions in King County that can enable the recovery of endangered or threatened salmonids, while maintaining the economic vitality and strength of the region;
- c. Address both King County's growth management needs and habitat conservation needs;
- d. ~~((Be comprehensive and based on))~~ Use best available science as defined in WAC 365-195-905 through 365-195-925;
- e. ~~((Address))~~ Improve water quality, water quantity and channel characteristics;
- f. ~~((Be developed in coordination))~~ Coordinate with key decision-makers and stakeholders; and
- g. ~~((Provide for monitoring and adaptive management))~~ Develop, implement and evaluate actions within a watershed-based program of data collection and analysis that documents the level of effectiveness of specific actions and provides information for adaptation of salmon conservation and recovery strategies.

The WRIA plans recommend an array of actions including the restoration, acquisition and preservation of landscapes, municipal programmatic activities, and public outreach and education. The plans suggest that programmatic activities for salmon habitat conservation can generally be accomplished with the following three tools: regulation, incentives and education. Consequently, in addition to capital projects, local governments including King County will need to incorporate salmon recovery objectives and strategies into their normal operations, making best use of a wide range of their authorities and programs.

E-602 King County should use the recommendations of approved Water Resource Inventory Area salmon habitat plans to inform the updates to development regulations as well as operations and capital planning for its surface water management, transportation, wastewater treatment, parks, and open space programs.

E-603 King County should seek to support Water Resource Inventory Area plan goals of maintaining intact natural landscapes through:

- a. Retaining low density land use designations such as Agriculture, Forestry and Rural;
- b. Promoting Current Use Taxation and other incentives;
- c. Promoting stewardship programs including development and implementation of Forest Plans, Farm Plans, and Rural Stewardship Plans;
- d. Promoting the use of Low Impact Development methods; and
- e. Acquiring property or conservation easements in areas of high ecological importance with unique or otherwise significant habitat values.

E-((202))604 King County has evaluated and will continue to monitor and evaluate programs and regulations to determine their effectiveness in contributing to ESA listed species conservation and recovery, and will update and enhance programs and plans where needed including evaluation of the zoning code, the Critical Areas Code, the Shoreline Master Program, the Clearing and Grading Code, the landscaping Code, the Surface Water Design Manual, the flood hazard ~~((reduction))~~ management plan,

regional wastewater services plan, best management practices for vegetation management and use of insecticides, herbicides and fungicides, integrated pest management, and best management practices for agricultural lands and forest lands under county authority. King County may amend these regulations, plans and best management practices to enhance their effectiveness in protecting and restoring salmonid habitat, using a variety of resources including best available science as defined in WAC 365-195-905 through 365-195-925 ~~((and resource documents developed by the Tri-County salmon conservation coalition and the shared strategy.))~~

E-~~((203))~~605 Through the Watershed Resource Inventory Area planning process, geographic areas vital to the conservation and recovery of listed salmonid species ~~((shall be))~~ have been identified. King County will evaluate this information to determine appropriate short and long-term strategies, including, but not limited to: designation of Fish and Wildlife Habitat Conservation Areas, development regulations (special district overlays, zoning, etc.) acquisitions, facility maintenance programs, and capital improvement projects.

E-~~((204))~~606 King County may use its authority under the Growth Management Act, including its authority to designate and protect critical areas, such as fish and wildlife habitat conservation areas, to preserve and protect ~~((critical))~~ key habitat ~~((listed))~~ for listed salmonid species by developing and implementing development regulations and nonregulatory programs.

E-~~((205))~~607 King County shall, in cooperation with the cities, ensure a no net loss of housing capacity that preserves the ability to accommodate the 2022 growth targets, while pursuing compliance with Endangered Species Act requirements. To achieve this goal, densities shall be increased on buildable lands, consistent with Policy U-463.

Local governments primarily have authority and influence over land use actions affecting habitat. However, protecting and restoring habitat is just one piece of the salmon recovery puzzle. Management of fish harvest, hatchery, hydropower, and water storage actions is also critical, and actions need to be coordinated with entities having authority in these areas.

E-608 King County should continue to take actions that ensure its habitat restoration and protection actions are implemented as part of a watershed-based salmon conservation strategy that integrates habitat actions with actions taken by harvest and hatchery managers. Harvest and hatchery managers specifically include tribes, the Washington Department of Fish and Wildlife, the National Marine Fisheries Service, and the United States Fish and Wildlife Service. Appropriate venues for this coordination include watershed plan implementation groups and other local or regional salmon management entities that rely on actions by habitat, harvest and hatchery managers to achieve specific goals and objectives.

Lastly, to ensure the long-term success of salmon recovery actions, King County will need to develop and implement a program that provides for the monitoring for effectiveness of recovery actions and provides valuable information to redirect and adapt salmonid recovery strategies and actions. Please see the Monitoring and Adaptive Management Section at the end of this chapter for policies related to this topic.

B. Puget Sound Partnership

King County, through its land use decisions, management of stormwater and wastewater discharges, development of reclaimed water supplies, cooperative habitat protection and restoration projects, and ongoing monitoring can play a key role in the conservation and recovery of Puget Sound.

The Puget Sound Partnership was created by the Washington State Legislature and Governor in July, 2007 to achieve the recovery of the Puget Sound ecosystem by the year 2020. This new state agency replaces both the Puget Sound Action Team and the Shared Strategy for Salmon Recovery. Its goal is to consolidate and significantly strengthen the federal, state, local, and private efforts undertaken to date to protect and restore the health of Puget Sound and its watersheds. The Puget Sound Partnership will become the umbrella for salmon recovery efforts in Puget Sound, including implementation of watershed-based salmon recovery plans prepared for Chinook salmon. King County has the opportunity, and responsibility, to make significant contributions to reaching this goal.

E-609 King County should actively participate in the Puget Sound Partnership's review of existing action plans for Puget Sound and development of the 2020 Action Agenda called for in the authorizing legislation for the Puget Sound Partnership.

E-610 King County should collaborate with other watershed forum partners to ensure that recommendations of watershed-based salmon recovery plans for King County are integrated with the Puget Sound Partnership recommendations.

E-611 King County should participate in the development of a science program that will provide a foundation for Puget Sound Partnership work. As part of this effort, the county should identify opportunities for linking its existing ambient monitoring of Puget Sound and freshwater streams with monitoring and assessment work conducted through the Puget Sound Partnership.

VII. Monitoring and Adaptive Management

King County's environment is constantly changing in response to land and water management actions that are within our control, as well as climate cycles and geologic processes that are beyond our control. The county makes significant investments in projects, programs, and policy implementation to help ensure that our environment supports a range of ecological, cultural and economic values that are fundamental to the region's quality of life.

King County's actions to protect and restore the environment need to be assessed on an ongoing basis to ensure that they are having the intended effect, and that they are responding to changing conditions. Our efforts to protect the environment will also need to reflect improvements in our knowledge about the natural environment and how human activity impacts ecological systems, and uncertainties about ecological and biological processes.

Assessing the effectiveness of specific and cumulative actions requires data collected within rigorous monitoring programs. Monitoring provides essential information to track (1) changes in the natural and built environment, (2) implementation of planned and required actions (like construction of wetland mitigation projects) and (3) effectiveness of our environmental protection actions. Monitoring information can support a formal Adaptive Management program to modify policies, goals, and management decisions as necessary.

Adaptive management can be used to help insure that projects, programs and policies are moving the county toward its environmental goals over time. Adaptive Management is defined as the process of making hypotheses of management outcomes, collecting data relevant to those hypotheses, and then using monitoring data to inform changes to policies and actions to better achieve intended goals. Adaptive management concepts are often applied in programs intended to address complex natural resource management problems, for example in Water Resource Inventory Area plans for salmon recovery or in Habitat Conservation Plans to comply with the ESA. The Washington Administrative Code calls for local governments to use monitoring and adaptive management to address uncertainties in Best Available Science for protecting critical areas like wetlands.

King County conducts a diverse array of monitoring activities, ranging from project-specific monitoring of Capital Improvement Projects, to mandated monitoring of municipal stormwater discharges in compliance with National Pollutant Discharge Elimination System permit requirements, to ambient monitoring of freshwater streams and Puget Sound. King County collects and maintains one of the longest continuous water quality monitoring programs for freshwater streams, rivers, lakes, and marine waters anywhere in the world. From a scientific and management perspective, this high quality, long-term monitoring program is very valuable. These monitoring programs allow the identification of temporal changes, such as impacts of climate change, and the identification of emerging pollution issues. The monitoring program also allows the quantification of water quality and aquatic habitat improvements. The data collected by these programs additionally provides the necessary baseline information for many scientific studies conducted on King County lakes and streams by research scientists at universities and state and federal agencies. Such collaborative efforts provide King County with detailed scientific efforts that would be difficult and expensive to obtain otherwise.

Financial resources for environmental protection programs, including monitoring, are limited. Because baseline monitoring does not result in an actual project "on the ground," and often is not mandated, it may not compete well with other priorities for limited funding. However, investments in monitoring will provide essential information for evaluating the effectiveness of current actions and guiding future policy decisions, priorities and investments. To make the most efficient use of limited resources, it is critical that the county look for opportunities to coordinate its data collection and dissemination efforts so that they

can meet as many information needs as possible. The county should also partner with entities conducting monitoring, including other governments and universities. When data are collected, it is important that its usefulness is maximized. "Metadata" is background information on data, and is necessary to facilitate the understanding, use, storage, sharing, and management of data. For example, metadata can describe how a particular data set was collected, provide definitions for types of data, and describe the reliability of the data.

E-701 King County should conduct a comprehensive and coordinated program of environmental monitoring and assessment to track long-term changes in climate (e.g., precipitation, temperature), water quality and quantity, land use, land cover and aquatic and terrestrial habitat, natural resource conditions, and biological resources as well as the effectiveness of regulations and capital improvement projects. This monitoring program should be coordinated with other jurisdictions, state and federal agencies, tribes, and universities to ensure the most efficient and effective use of monitoring data.

E-702 King County should seek to develop and maintain a publicly accessible, geo-spatial database on environmental conditions to inform policy decisions, support technical collaboration, and inform the public. All King County monitoring data should be supported by metadata.

E-703 King County should establish a decision-support system suitable for adaptive management that uses data from its environmental monitoring programs.

A. Performance Measurement, Performance Management, and KingStat

As noted in the Comprehensive Plan's Introduction section, Performance Measurement and Management are increasingly being used throughout King County government to:

- Ensure county goals are being met;
- Improve county services, where necessary;
- Increase transparency for the public;
- Increase use of data for more informed public discussion and decision-making; and
- Increase accountability at all levels of government.

Like adaptive management in realm of science, performance management includes collecting data, analyzing data to inform decision-making, and making programmatic course corrections based on this analysis.

King County has already started to report to the public both community-level conditions and agency performance measures. Monitoring data referenced in this chapter serves as a core element of helping elected officials and the public stay informed about the state of the environment and the effectiveness of agency programs.

The Executive's KingStat program is using environmental monitoring data to assess environmental conditions, develop appropriate county responses, and provide an opportunity to collaborate and partner with other organizations in making improvements. With respect to environmental conditions, data used in KingStat includes marine water, freshwater, terrestrial habitat, fish and wildlife, atmosphere, and resource consumption.

E-704 The county should continue to collect data on key natural resource management and environmental parameters for use in KingStat and report its findings to the public, partner agencies, and decision-makers. Information collected through KingStat should be used to inform decisions about policies, work program priorities and resource allocation.

B. National Pollutant Discharge Elimination System Compliance

A new National Pollutant Discharge Elimination System general municipal stormwater permit for discharges from the county's municipal stormwater system was issued in January of 2007 for a term of five years. The new permit contains prescriptive requirements for controlling and monitoring pollutants in municipal stormwater.

E-705 King County shall carry out monitoring in compliance with its National Pollutant Discharge Elimination System municipal permit. Data collected through these monitoring efforts should be coordinated with King County's other monitoring efforts to the extent possible, and carried out in the most cost-effective and useful manner possible.

C. Water Resource Inventory Areas Plan Implementation

In 2012 NMFS will evaluate the progress of efforts to recover Puget Sound Chinook salmon and suggest necessary improvements in recovery actions and strategies. In doing so, NMFS will seek to use local information on action implementation and its effects on habitat and salmon populations.

E-706 King County should work with other Water Resource Inventory Area plan partners to establish a program (framework and methodology) for monitoring project specific and cumulative effectiveness of King County salmonid recovery actions. This program should include data collection and analysis and should provide information to guide an adaptive management approach to salmonid recovery.

E-707 The county should coordinate with other governments, agencies, tribes, non-governmental organizations and others to develop and implement regional and watershed-based Adaptive Management programs focused on achieving salmon recovery goals.

D. Effectiveness of Critical Areas Regulations

Under the GMA, the next state-required review of development regulations to protect critical areas is 2011. GMA requires that local governments include Best Available Science in the development of land use policies and regulations to protect the functions and values of critical areas. Washington Administrative Code calls for the use of a precautionary approach where the science is uncertain, coupled with adaptive management.

E-708 King County should develop and implement a framework for effectiveness monitoring of critical areas regulations, and use monitoring data to inform the future review and updates of its critical areas policies and regulations.